



# **Air Quality Permitting Statement of Basis**

**July 6, 2005**

**Tier II Operating Permit and Permit to Construct  
No. T2-040014**

**St. Luke's Regional Medical Center  
Boise, Idaho**

**Facility ID No. 001-00029**

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**FINAL PERMIT**

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## **Acronyms, Units, and Chemical Nomenclature**

<b>AFS</b>	<b>AIRS Facility Subsystem</b>
<b>AIRS</b>	<b>Aerometric Information Retrieval System</b>
<b>AQCR</b>	<b>Air Quality Control Region</b>
<b>ASTM</b>	<b>American Society for Testing and Materials</b>
<b>Btu</b>	<b>Btu's per gallon</b>
<b>CO</b>	<b>carbon monoxide</b>
<b>DEQ</b>	<b>Department of Environmental Quality</b>
<b>EF</b>	<b>emission factor</b>
<b>Btu</b>	<b>British thermal units</b>
<b>HAPs</b>	<b>hazardous air pollutants</b>
<b>hp</b>	<b>horse power</b>
<b>hp-hr</b>	<b>horse power-hour</b>
<b>IDAPA</b>	<b>a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act</b>
<b>lb/hr</b>	<b>pound per hour</b>
<b>MACT</b>	<b>Maximum Available Control Technology</b>
<b>MMBtu</b>	<b>million British thermal units</b>
<b>NAAQS</b>	<b>National Ambient Air Quality Standards</b>
<b>NESHAP</b>	<b>National Emission Standards for Hazardous Air Pollutants</b>
<b>NO<sub>x</sub></b>	<b>oxides of nitrogen</b>
<b>NSPS</b>	<b>New Source Performance Standards</b>
<b>O<sub>3</sub></b>	<b>ozone</b>
<b>PAH</b>	<b>polyaromatic hydrocarbon</b>
<b>Pb</b>	<b>lead</b>
<b>PM</b>	<b>particulate matter</b>
<b>PM<sub>10</sub></b>	<b>particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers</b>
<b>PSD</b>	<b>Prevention of Significant Deterioration</b>
<b>PTC</b>	<b>permit to construct</b>
<b>PTE</b>	<b>potential to emit</b>
<b>Rules</b>	<b>Rules for the Control of Air Pollution in Idaho</b>
<b>SLRMC</b>	<b>Saint Luke's Regional Medical Center</b>
<b>SIC</b>	<b>Standard Industrial Classification</b>
<b>SIP</b>	<b>State Implementation Plan</b>
<b>SO<sub>2</sub></b>	<b>sulfur dioxide</b>
<b>TAPs</b>	<b>toxic air pollutants</b>
<b>T/yr</b>	<b>tons per year</b>
<b>UTM</b>	<b>Universal Transverse Mercator</b>

## 1. PURPOSE

The purpose for this statement of basis is to satisfy the requirements of IDAPA 58.01.01 Subpart 400 et seq. and 200 et seq., Rules for the Control of Air Pollution in Idaho, for issuing Tier II operating permits and permits to construct.

## 2. FACILITY DESCRIPTION

Saint Luke's Regional Medical Center (SLRMC) is a general medical and surgical hospital located at 140 E. Jefferson Street in Boise. The existing emissions sources at SLRMC are four dual-fuel boilers, seven diesel-fired emergency generators, three sterilizers, two disposers, three aerators, six diesel storage tanks, three cooling towers, and paved roads in the parking areas.

## 3. FACILITY / AREA CLASSIFICATION

The SLRMC is not a major facility as defined in IDAPA 58.01.01.205, nor is it a designated facility as defined in IDAPA 58.01.01.006.27. The primary Standard Industrial Classification (SIC) code for the facility is 8062, *General Medical and Surgical Hospitals*. The Aerometric Information Retrieval System (AIRS) facility classification is *synthetic minor* (SM)—potential uncontrolled oxides of nitrogen and sulfur dioxide emissions are greater than 100 tons per year (T/yr), but permitted emissions are less than 100 T/yr. The potential emissions rates for hazardous air pollutants (HAPs) are below 25 T/yr collectively and less than 10 T/yr for any single HAP. The facility is not subject to Prevention of Significant Deterioration (PSD) requirements because its potential to emit is less than all applicable PSD major source thresholds.

The SLRMC is located in the city of Boise, which is located in Northern Ada County. Northern Ada County is located in Air Quality Control Region (AQCR) 64 and Universal Transverse Mercator (UTM) Zone 11. Northern Ada County is an attainment area for carbon monoxide (CO) and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM<sub>10</sub>), and unclassifiable for sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), ozone (O<sub>3</sub>), and lead (Pb). There are no Class I areas within 10 kilometers of the facility.

The AIRS information for each regulated air pollutant emitted by SLRMC is provided in Section 8 of this document. This information is entered into the U.S. Environmental Protection Agency (EPA) AIRS database.

## 4. APPLICATION SCOPE

On June 3, 2004, the Department of Environmental Quality (DEQ) received an application from SLRMC requesting an increase in the boiler's annual natural gas consumption, limited in the facility's existing Tier II operating permit No. 001-00029, issued on April 2, 2002. Also, SLRMC requested increasing the hours of operation for the emergency generators, limited in the facility's existing PTC No. P-030063, issued on March 26, 2004. Because the requested modifications are to modify both the facility's Tier II operating permit and PTC, DEQ is processing the application as a combo Tier II operating permit and permit to construct.

### 4.1 Application Chronology

6/3/04	DEQ received an application from SLRMC to modify the facility's existing Tier II operating permit and PTC.
6/22/04	DEQ determined the application incomplete.
7/26/04	DEQ received a request from SLRMC to review the draft permit.

7/19/04	DEQ received additional information from SLRMC.
7/26/04	DEQ received additional information from SLRMC.
8/16/04	DEQ determined SLRMC's permit application complete.
10/25/04	DEQ received updated Toxic Air Pollutants (TAPs) emissions rates from SLRMC.
11/1/04	DEQ sent an electronic copy of the draft permit to the Boise Regional Office for review.
11/23/04	DEQ sent SLRMC a copy of draft permit No. T2-040014 for review.
2/24/05	DEQ sent SLRMC a copy of draft permit No. T2-040014 for review for the second time.

## **5. PERMIT ANALYSIS**

This section of the statement of basis describes the regulatory requirements for this Tier II operating permit and permit to construct.

### **5.1 Process Description**

#### **General Description**

The following section describes the existing boiler and generator operations at the facility, along with some of the requested changes:

- There are four identical Cleaver Brooks boilers at SLRMC—each rated at the same capacity with the same stack parameters. Each boiler may operate using either natural gas fuel or ASTM Grade 2 fuel oil. For this permitting action, SLRMC requested operational flexibility to increase the operating boiler's annual natural gas consumption from the permitted 133 million cubic feet per year (MM ft<sup>3</sup>/yr) to 256 MM ft<sup>3</sup>/yr.
- In accordance with the facility's existing Tier II operating permit, issued on April 2, 2002, only one of the four boilers may be operated at a time, when combusting ASTM Grade 2 fuel oil. The boilers can operate on ASTM Grade 2 fuel oil for up to 1,298 hours per year.
- In addition, seven Caterpillar diesel-fired emergency generators, rated at various capacities exist at SLRMC. The generators were permitted by DEQ on April 2, 2002 and on March 26, 2004. The facility requested to increase the short-term operational limit of each generator from the current limit of 45 minutes per day to four hours per day; and the annual limits from 60 hours per year (hr/yr) to 208 hr/yr. This will allow SLRMC the operational flexibility to perform a 4-hour load bank test for any generator periodically throughout the year.
- Combustion product emissions from the boilers and generators (i.e., PM<sub>10</sub>, CO, NO<sub>x</sub>, SO<sub>2</sub>, and VOC) are uncontrolled.

### **5.2 Emissions Estimates**

Emissions estimates were provided by SLRMC's consultant (CH2M HILL) and are included in the permit application materials that were submitted to DEQ on 6/3/04, 7/19/04, 10/25/04, and 10/25/04. Appendix A of this statement of basis contains the estimated increase in the boilers' controlled and uncontrolled potential to emit (PTE) emissions for particulate matter (PM), PM<sub>10</sub>, CO, SO<sub>2</sub>, VOC, NO<sub>x</sub>, Pb, HAPs, and TAPs. The boilers' emissions estimates for these pollutants were based on emissions factors described in the U.S. EPA's *Compilation of Air Pollution Emission Factors*, AP-42, Fifth Edition, Section 1.4, Natural Gas Combustion (7/98). SLRMC requested to increase the annual natural gas consumption for the four boilers from the previously permitted 133 MM ft<sup>3</sup>/yr to 256 MM ft<sup>3</sup>/yr. For

the boilers' emissions estimates, all PM emissions are assumed to be PM<sub>10</sub>. Emissions from boilers operating on ASTM Grade 2 fuel oil were also estimated, even though the facility did not request to increase the permitted hours of operations (1,298 hrs/yr), which are existing in the Tier II operating permit No. 001-00029, issued April 2, 2002. However, emissions from the boilers operating on ASTM Grade 2 fuel oil are included in the air dispersion modeling.

The emergency generators' controlled and uncontrolled potential to emit (PTE) emissions for PM, PM<sub>10</sub>, CO, SO<sub>2</sub>, VOC, NO<sub>x</sub>, Pb, TAPs, and HAPs were estimated by CH2M HILL and are included in the application materials submitted to DEQ on 7/19/04 and 10/25/04. Appendix A of this document contains the increase in the generators' controlled and uncontrolled PTE emissions estimates for PM, PM<sub>10</sub>, CO, SO<sub>2</sub>, VOC, NO<sub>x</sub>, Pb, HAPs, and TAPs. The facility requested to modify the generators' PTC No. P-030063, issued on March 26, 2004, by increasing the short-term operation limit from 45 minutes per day to four hours per day. The annual hours of operation limits are also requested to be increased from the previously permitted 60 hours per year to 208 hours per year. This will allow SLRMC operational flexibility during their generator maintenance runs and load bank tests. The generators' emissions estimates for SO<sub>2</sub>, HAPs, and TAPs were based on emissions factors described in the U.S. EPA's *Compilation of Air Pollution Emission Factors*, AP-42, Fifth Edition, Section 3.3, Gasoline and Diesel Industrial Engines (1/95) and Section 3.4, Large Stationary Diesel and All Stationary Dual-Fuel Engines (10/96). The emissions estimates for PM, PM<sub>10</sub>, CO, VOC, and NO<sub>x</sub> were based on emissions data supplied by the distributor, Western States Equipment. For the generators emissions estimates, all PM emissions are assumed to be PM<sub>10</sub>.

The estimated emissions increases for the criteria air pollutants from the boilers and the generators are summarized in Table 5.1. The controlled emissions estimates presented in Table 5.1 provided the basis of the analysis for PM<sub>10</sub>, CO, NO<sub>x</sub>, and SO<sub>2</sub> compliance with the National Ambient Air Quality Standards (NAAQS) – see the modeling results in Appendix B of this document.

**Table 5.1 CONTROLLED EMISSIONS RATES INCREASE FROM THE BOILERS AND GENERATORS**

Source Description	PM <sup>a</sup>		PM <sub>10</sub> <sup>b</sup>		CO <sup>c</sup>		NO <sub>x</sub> <sup>d</sup>		SO <sub>2</sub> <sup>e</sup>		VOC <sup>f</sup>		Pb <sup>g</sup>	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Four boiler stacks	0.88	0.48	0.88	0.48	9.64	5.16	11.48	6.16	0.08	0.04	0.64	0.32	0.00	0.00
Seven emergency <sup>h</sup> generators stacks	5.15	0.38	5.15	0.383	29.03	2.15	212.3	15.70	32.01	2.36	4.20	0.32	0.00	0.00
Total	6.03	0.86	6.03	0.86	38.67	7.31	223.8	21.86	32.09	2.40	4.84	0.64	0.00	0.00

<sup>a</sup> Particulate matter

<sup>b</sup> Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

<sup>c</sup> Carbon monoxide

<sup>d</sup> Nitrogen oxides

<sup>e</sup> Sulfur dioxide

<sup>f</sup> Volatile organic compound

<sup>g</sup> Lead

<sup>h</sup> Data taken from Tier II OP/PTC application

It should be noted that, as shown in Table 5.1, the total increase in any criteria air pollutants emissions that resulted from the modifications of the boilers and the generators did not trigger the major source threshold limits of 100 T/yr. Thus, emissions from SLRMC are below the permitting requirements that are mandated under the Title V permitting program.

Also for Title V purposes, the PTE for any single HAP is estimated to be less than 10 T/yr, the major source threshold of any HAP. The PTE for a combination of two HAPs or more from the facility are below the major source threshold of 25 T/yr—see Appendix A of this document.

Emissions estimates based on the total natural gas fuel consumption of 256 million cubic feet per year from all boilers were also estimated. Additionally, emissions from boilers when operating using ASTM Grade 2 fuel oil were estimated and included in the modeling. These emissions calculations provided the basis for the emissions limits for PM<sub>10</sub>, CO, NO<sub>x</sub>, and SO<sub>2</sub> in the permit and for the compliance with the NAAQS—see Appendix B of this document.

Detailed emissions estimates are included in Appendix A of this statement of basis. It should be noted that the permitted emissions limits contained in the permit were used to determine the processing fee assessed in accordance with IDAPA 58.01.01.407.

### **5.3 Modeling**

Appendix B of this statement of basis contains the modeling review memorandum, which includes a discussion of the modeling analysis conducted for this project. DEQ determined that SLRMC has successfully demonstrated that the operations at the facility will not cause or significantly contribute to a violation of any NAAQS. Also, the modeled toxic air pollutants showed the facility will not exceed any TAP increments.

### **5.4 Regulatory Review**

This section describes the regulatory analysis of the applicable air quality rules with respect to this permit.

#### IDAPA 58.01.01.401 ..... Tier II Operating Permit

This permitting action is a modification of Tier II Operating Permit No.001-00029, issued April 2, 2002. In addition, this permitting action is to modify the PTC No.P-030063, issued March 26, 2004. In accordance with Tier II operating permit General Conditions, modifications are subject to DEQ review in accordance with IDAPA 58.01.01.200 et seq. The proposed modification will comply with all applicable emissions standards and will not cause or contribute to violation of any applicable air quality standard as required by IDAPA 58.01.01.203.01, 02 and 03 and IDAPA 58.01.01.403.02.

#### IDAPA 58.01.01.404.01.c ..... Opportunity for Public Comment

This Tier II operating permit is subject to the provisions of IDAPA 58.01.01.404.01.c, and a 30-day public comment period will be provided by DEQ.

#### IDAPA 58.01.01.406 ..... Obligation to Comply

Receipt of this Tier II permit does not relieve SLRMC from the responsibility to comply with all federal, state, and local rules and regulations.

#### IDAPA 58.01.01.407 ..... Permit Processing Fees for Tier II Permits

This project is subject to the fee provisions of IDAPA 58.01.01.407.01, and SLRMC was assessed a processing fee of \$5,000.00 for a permitted emissions for PM<sub>10</sub>, CO, NO<sub>x</sub>, and SO<sub>2</sub> of 38.04 T/yr.

#### IDAPA 58.01.01.577 ..... Ambient Air Quality Standards for Specific Air Pollutants

SLRMC submitted a modeling analysis, demonstrating that emissions rates from the facility will not cause or significantly contribute to a NAAQS violation; therefore, the requirements of IDAPA 58.01.01.403.02 and IDAPA 58.01.01.577 are satisfied.

Also, the TAPs emissions from the facility were demonstrated to meet the requirements specified in IDAPA 58.01.01.585-586 and as required in IDAPA 58.01.01.210.

IDAPA 58.01.01.625..... Visible Emission Limitation

Emissions from all stationary point sources in the state of Idaho are required to comply with the opacity standards of IDAPA 58.01.01.625-626, unless exempted under Section 625.01. Sources at the facility are subject to this standard.

40 CFR 60 ..... New Source Performance Standards

Currently, boilers Nos. 3 and 4 are subject to the terms and provisions of New Source Performance Standard (NSPS), Subpart Dc. After modification, boilers Nos. 1 and 2 will be subject to NSPS rules.

40 CFR 61 and 63..... National Emission Standards for Hazardous Air Pollutants and Maximum Achievable Control Technology

The facility is not currently subject to any National Emission Standard for Hazardous Air Pollutants or Maximum Achievable Control Technology requirements at this time.

40 CFR 52 ..... Prevention of Significant Deterioration

This permit does not include any Prevention of Significant Deterioration (PSD) issues.

## **5.5 Regional Review of Draft Permit**

A copy of the draft Tier II operating permit and DEQ's statement of basis were provided to the Boise Regional office on November 16, 2004.

## **5.7 Facility Review of Draft Permit**

On November 23, 2004, a copy of the draft Tier II operating permit (No. T2-040014) and the statement of basis were issued to SLRMC for review. On February 24, 2005, DEQ sent SLRMC a copy of draft permit No. T2-040014 for review for the second time

## **6. PERMIT CONDITIONS**

This section lists only those permit conditions that have changed or have been deleted as a result of this permit modification. All other permit conditions remain unchanged. Permit conditions related to the modified permit are identified as Modified Permit Conditions. Permit conditions related to the existing permit are identified as Existing Permit Conditions.

- 6.1 Existing Permit Condition 3.3 limits PM, PM<sub>10</sub>, and NO<sub>x</sub> emissions rates from each boiler stack to 0.4 lb/hr, 0.4 lb/hr, and 4.10 lb/hr, respectively. Also, it limits the aggregated boilers NO<sub>x</sub> emissions to 9.29 T/yr. This existing permit condition was deleted in the modified permit. The modified permit limits the natural gas consumption for boilers operating at the facility to 256 MM ft<sup>3</sup>/yr. Emissions rates for all criteria air pollutants resulted from the fuel consumption showed compliance with NAAQS. Therefore, this existing permit condition was deemed unnecessary and was deleted from the modified permit.
- 6.2 Existing Permit Condition 3.5 limits the total maximum natural gas consumption of the boilers to 133 million standard cubic feet in any 12-month period.
- 6.3 Modified Permit Condition 3.6 limits the maximum amount of natural gas combusted in the boilers to 256 million standard cubic feet per any consecutive 12-month period.
- 6.4 Existing Permit Condition 3.9 limits the daily operating hours when boilers combusting ASTM Grade 2 fuel oil to the following equation:

Hours/day = 5.08/S

Where S indicates that the weight percent of sulfur in the oil (e.g., if the fuel is 0.5% sulfur, then S = 0.5).

- 6.5 Modified Permit Condition 3.8 limits the operation of each boiler on ASTM Grade 2 fuel oil to a maximum of 10 hours in any 24-hour period. A 10 hours operating limits for each boiler while combusting ASTM Grade 2 fuel oil was necessary in order to comply with the NAAQS for the SO<sub>2</sub> 24-hour averaging period – refer to the modeling memo.
- 6.6 Existing Permit Condition 3.12 required the permittee to meet the requirements of 40 CFR 60.48c(g) for boilers Nos. 3 and 4.
- 6.7 Revised Permit Condition 3.12 requires the permittee to meet the requirements of 40 CFR 60.48c(g) for boilers Nos. 1, 2, 3, and 4. After modification boilers Nos. 1 and 2 became subject to NSPS, Subpart Dc rules.

Permit Condition 3.12 is included in the permit to determine compliance with the amount of natural gas consumed in the boilers, as required in 40 CFR 60.48c(g)

It should be noted that SLRMC sent a letter to EPA Region 10 on December 22, 2004 in which they requested from EPA when more than one boiler is firing natural gas simultaneously, a single natural gas flow meter may be used that measures the total natural gas consumption for the boilers. Then SLRMC will divide each boiler design heat input capacity by the total of the design heat input capacities of each boiler, and will use this quantity to prorate the natural gas consumption on each boiler on a monthly basis. EPA has approved a similar situation like this in a different jurisdiction (i.e., state of Alaska). On June 16, 2005, EPA sent SLRMC a letter in which it approved the use of a single natural gas flow meter to monitor the natural gas consumption for the four boilers at the facility – for more information regarding the EPA letter to SLRMC, please refer to Appendix A of this statement of basis.

- 6.8 Revised Permit Condition 3.13 (2<sup>nd</sup> bullet) was added to include the NSPS reporting requirements for boilers Nos. 1 and 2.

It should be noted that boilers Nos. 3 and 4 are subject to NSPS requirements of 40 CFR 60, Subpart Dc. A semi-annual calendar report is required by 40 CFR 60.48c for the sulfur content in the ASTM Grade 2 fuel oil. However, in this permit, SLRMC is required to report the sulfur content in ASTM Grade 2 fuel oil in an annual calendar basis, per the October 7, 1993 letter from EPA Region 10 to SLRMC, in which it was approved that SLRMC to report the sulfur content in ASTM Grade 2 fuel oil annually for boilers Nos. 3 and 4.

However, for boilers Nos. 1 and 2, the reporting will be semi-annual, as required in 40 CFR 60.48c, unless EPA specifies a different reporting period. Nevertheless, on October 12, 2004, SLRMC sent EPA Region 10 a letter requesting to change the reporting to annually for boilers Nos. 1 and 2.

- 6.9 Existing Permit Condition 2.7 (PTC No. P-030063, issued March 26, 04) limits the hours of operation for each emergency generator to 45 minutes in any 24-hour period and to 60 hours per any consecutive 12-month period.
- 6.10 Modified Permit Condition 4.5 limits the hours of operation for each emergency generator to four hours in any 24-hour period and to 208 hours per any consecutive 12-month period.

## 7. PUBLIC COMMENT

A public comment period on the proposed Tier II operating permit and permit to construct was provided from March 10 through April 11, 2005, as required by IDAPA 58.01.01.404.01.c. No comments were received.

## 8. AIRS INFORMATION

**Table 8.1 AIRS/AFS<sup>a</sup> FACILITY-WIDE CLASSIFICATION<sup>b</sup> DATA ENTRY FORM**

AIR PROGRAM	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	TITLE V	AREA CLASSIFICATION A – Attainment U – Unclassifiable N – Nonattainment
POLLUTANT							
SO <sub>2</sub>	SM						U
NO <sub>x</sub>	SM						U
CO	B						U
PM <sub>10</sub>	B						U
PT (Particulate)	B						U
VOC	B						U
THAP (Total HAPs)	B						U
			APPLICABLE SUBPART				
			Dc				

<sup>a</sup> Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

<sup>b</sup> AIRS/AFS Classification Codes:

- A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For NESHAP only, class "A" is applied to each pollutant which is below the 10 ton-per-year (T/yr) threshold, but which contributes to a plant total in excess of 25 T/yr of all NESHAP pollutants.
- SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.
- B = Actual and potential emissions below all applicable major source thresholds.
- C = Class is unknown.
- ND = Major source thresholds are not defined (e.g., radionuclides).

## 9. FEES

In accordance with IDAPA 58.01.01.407.01, a processing fee of \$5,000.00 is required because the permitted emissions are of 10 to less than 100 T/yr. The emissions associated with this permit are given in Table 9.1.

SLRMC is not a major facility as defined in IDAPA 58.01.01.008.10. Therefore, registration fees are not applicable in accordance with IDAPA 58.01.01.387.

**Table 9.1 Tier II Processing Fee Summary**

Emissions Inventory	
Pollutant	Permitted Emissions
PM <sub>10</sub>	1.24
CO	11.54
NO <sub>x</sub>	15.54
SO <sub>2</sub>	9.72
<b>Total:</b>	<b>38.04</b>
Tier II Fee	\$5,000.00
Fees paid to date	\$0.00
Fee Due	<b>\$5,000.00</b>

## **10. RECOMMENDATION**

Based on the review of the application materials and all applicable state and federal regulations, staff recommends that DEQ issue final Tier II Operating Permit and Permit to Construct No.T2-040014 for SLRMC in accordance with IDAPA 58.01.01.404. PSD requirements do not apply.

HE/sd

Project No. T2-040014

## **APPENDIX A**

**St. Luke's Regional Medical Center, Boise  
T2-040014**

**Emission Estimates**

Modeling Data:

Boiler 1 on Oil  
Boiler 1 on NG  
Boiler 2 on NG

Hours  
1,438  
7,482  
1,438

Boiler 1 on Oil

Criteria Pollutant	CAS No.	Emission Factor (lb/Mgal)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM)		2	0.419	543.308	0.272
Nitrogen Oxides (NOx)		20	4.188	5433.067	2.717
Sulfur Oxides		71	14.889	19387.389	9.644
Carbon Monoxide (CO)		5	1.048	1368.894	0.679
TOCS		0.588	0.116	161.088	0.079

Boiler 1 on NG

Criteria Pollutant	CAS No.	Emission Factor (lb/108 scf)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM)		7.8	0.218	1829.067	0.816
Nitrogen Oxides (NOx)		100	2.879	21434.981	10.717
Sulfur Oxides		0.8	0.017	128.610	0.064
Carbon Monoxide (CO)		84	2.413	18005.367	8.008
VOC		5.5	0.188	1178.823	0.588

TOTAL Annual Boiler 1 (7482)

Criteria Pollutant	Emission Rate (ton/yr)
Total Particulate Matter (PM)	1.08
Nitrogen Oxides (NOx)	13.43
Sulfur Oxides	9.71
Carbon Monoxide (CO)	0.01
VOC	0.688

1.08 13.43 9.71  
0.18 2.07 0.01

7482  
1438

Total Annual Boiler 2 (1438 hours)

Criteria Pollutant	Emission Rate (ton/yr)
Total Particulate Matter (PM)	
Nitrogen Oxides (NOx)	
Sulfur Oxides	
Carbon Monoxide (CO)	
VOC	0.114

Short Term Boiler- only 10 hours of operation on No. 2 fuel oil

	8 HR, 3 HR & 1 HR Emission Rate (lb/hr)	24 HR Emission Rate (lb/hr)
Total Particulate Matter (PM)	0.42	0.17
Nitrogen Oxides (NOx)	4.18	
Sulfur Oxides		
Carbon Monoxide (CO)	1.05	
TOCS	0.12	

Based on 10 hours of operation per 24-hour period.  
Based on 10 hours of operation per 24-hour period.

VS.

Short Term Boiler-natural gas 24 hours

	Emission Rate (lb/hr)
Total Particulate Matter (PM)	
Nitrogen Oxides (NOx)	2.87
Sulfur Oxides	0.02
Carbon Monoxide (CO)	
VOC	0.18

# **St. Luke's Regional Medical Center - Boilers (Boilers burning Natural Gas)**

Boiler (MMBtu/hr) <sup>a</sup>	28.3
Model No.	CE385-750
Fuel Type	Natural Gas
Maximum Firing Rate (MMBtu/hr)	2,875.00
Maximum Heat Input Rating (Btu/hr)	21,300,000
Maximum Operation Limit (scfh) <sup>b</sup>	8,800
Maximum Firing Rate (MMBtu/hr)	288
Heat Value of Fuel (Btu/scf)	1,000

\* Note: St. Luke's is requesting to increase annual natural gas consumption in Boilers No. 1, 2, 3, and 4 to 288 million cubic feet per year (MMBtu/hr) for operational flexibility. There are four boilers each rated at the same capacity and contain the same stack parameters. Therefore, emission calculations are presented for only one boiler.

Criteria Pollutant <sup>d</sup>	CAS No.	Emission Factor (lb/10 <sup>6</sup> scf)	Uncontrolled Potential to Emit <sup>c</sup>		
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM) <sup>e</sup>		7.6	0.216	1,943	0.97
Nitrogen Oxides (NOx)		100.0	2.87	25,806	12.78
Sulfur Oxides		0.8	0.817	188	0.08
Carbon Monoxide (CO)		84.6	2.41	21,478	10.74
VOC		3.3	0.189	1,688	0.70

Toxic Air Pollutants <sup>d</sup>	CAS No.	Emission Factor (lb/10 <sup>6</sup> scf)	Uncontrolled Potential to Emit <sup>c</sup>			EPA 82,91,91,906/ 906 - SL	PTE Emission Rate vs. SL
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)		
3-Methylchlorobenzene	68-40-3	1,300.00	0.178-08	4,300.00	2,300.00	2,300.00	Below
Benzene	71-43-2	2,100.00	0.000-00	0.000-00	0.000-00	0.000-00	Below
Benzonitrile	60-11-0	1,300.00	0.178-08	4,300.00	2,300.00	2,300.00	Below
Formaldehyde	50-00-0	7,100.00	0.100-00	1,000.00	0.500-00	0.500-00	Exceeds
Heptane	110-82-3	1,300.00	0.178-08	4,300.00	2,300.00	2,300.00	Below
Naphthalene	91-50-3	6,100.00	1.700-00	1,700.00	0.700-00	0.700-00	Below
Octane	109-86-6	2,300.00	0.200-00	6,000.00	3,000.00	3,000.00	Below
Toluene	109-86-3	3,400.00	0.770-00	8,000.00	4,000.00	4,000.00	Below

Toxic Air Pollutants-Metals <sup>d</sup>	CAS Number	Emission Factor (lb/10 <sup>6</sup> scf)	Uncontrolled Potential to Emit <sup>c</sup>			EPA 82,91,91,906/ 906 - SL	PTE Emission Rate vs. SL
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)		
Arsenic	7440-39-3	2,000.00	0.700-00	6,110.00	2,600.00	2,600.00	Exceeds
Barium	7440-39-3	4,400.00	1.500-00	1,100.00	0.500-00	0.500-00	Below
Beryllium	7440-41-7	1,300.00	0.400-00	3,070.00	1,300.00	1,300.00	Below
Cadmium	7440-49-9	1,100.00	0.310-00	2,810.00	1,410.00	1,410.00	Exceeds
Chromium	7440-47-0	1,200.00	4.000-00	3,000.00	1,700.00	1,700.00	Exceeds
Cobalt	7440-48-4	8,200.00	0.210-00	1,800.00	1,000.00	1,000.00	Below
Copper	7440-50-9	8,300.00	0.240-00	2,100.00	1,000.00	1,000.00	Below
Mercury	7489-92-1	3,300.00	1.000-00	8,710.00	4,000.00	4,000.00	Below
Molybdenum	7439-98-7	1,100.00	0.310-00	2,810.00	1,410.00	1,410.00	Below
Nickel	7440-00-0	2,100.00	0.600-00	5,370.00	2,600.00	2,600.00	Exceeds
Selenium	7782-49-2	3,200.00	0.800-00	6,140.00	3,000.00	3,000.00	Below
Vanadium	1814-35-1	2,300.00	0.810-00	6,900.00	3,300.00	3,300.00	Below
Zinc	7440-66-3	4,000.00	1.100-00	1,000.00	0.110-00	0.110-00	Below

## **Notes:**

<sup>1</sup> Uncontrolled potential emissions are equal to actual emissions.

<sup>2</sup> Criteria Pollutants, small uncontrolled boilers (EPA AP-42, Section 1.4 Natural Gas Combustion, Tables 1.4-1 and 1.4-8).

<sup>3</sup> PM emission factor is assumed to equal PM<sub>10</sub>.

<sup>4</sup> Toxic Air Pollutants (EPA AP-42, Section 1.4 Natural Gas Combustion, Table 1.4-9).

<sup>5</sup> Metals from Natural Gas Combustion (EPA AP-42, Section 1.4 Natural Gas Combustion, Table 1.4-9).

**St. Lukes Regional Medical Center - Boilers (Boilers burning No. 2 fuel oil)**

Boiler (Mitsubishi)	28.3
Model No.	C9305-700
Fuel Type	Distillate #2
Maximum sulfur content (0.50%)	0.5
Maximum Firing Rate (gal/hr)	288.3
Maximum Heat Input Rating (Btu/hr)	28,300,000
Maximum Operation Limit (hr/yr)	1,200
Maximum Firing Rate (gal/yr)	271,888
Heat Value of Fuel (Btu/gal)	140,000

\* Note: There are four boilers each rated at the same capacity and contain the same stack parameters. As stated in the Tier II Operating Permit dated April 2, 2008 under condition 3.2: "Only one of the four boilers may be operated at a time while burning No. 2 fuel oil". Therefore, emission calculations are presented for only one boiler.

Criteria Pollutant <sup>a</sup>	CAS No.	Emission Factor (lb/Mgal)	Uncontrolled Potential to Emit <sup>1</sup>		
			Emission Rate (Btu/hr)	Emission Rate (Btu/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM) <sup>b</sup>		2.0	0.48	543	0.27
Nitrogen Oxides (NOx)		20.9	4.19	5,435	2.72
Sulfur Oxides <sup>c</sup>		71.0	14.88	19,287	9.64
Carbon Monoxide (CO)		5.0	1.05	1,306	0.66
TOC <sup>d</sup>		0.999	0.12	151	0.08

Boiler  
Boiler

Based on 10 hours of operation per 24-hour period.  
Based on 10 hours of operation per 24-hour period.

Toxic Air Pollutants <sup>e</sup>	CAS No.	Emission Factor (lb/Mgal)	Uncontrolled Potential to Emit			IDAPA 88.01.01.0005 PTE Emission Rate vs. SL	
			Emission Rate (Btu/hr)	Emission Rate (Btu/yr)	Emission Rate (ton/yr)	88 - SL (Btu/hr)	Rate vs. SL
Benzene	71-43-2	2.14E-04	4.48E-05	1.23E-05	6.09E-06	6.09E-04	Below
1,1-Dichloroethane	100-41-4	6.39E-05	1.30E-05	3.69E-06	1.81E-06	2.80E-04	Below
Formaldehyde	50-40-0	3.97E-05	8.91E-06	1.89E-06	9.39E-07	1.10E-04	Below
Methanol	67-58-0	1.13E-05	2.38E-06	6.45E-07	3.21E-07	3.21E-05	Below
Methyl Chloroform <sup>f</sup>	71-55-6	2.99E-04	6.40E-05	1.74E-05	8.71E-06	1.27E-05	Below
1,1,1-Trichloroethane	108-90-3	6.39E-05	1.30E-05	3.69E-06	1.81E-06	2.80E-04	Below
o-Xylene	1320-90-7	1.09E-04	2.38E-05	6.50E-06	3.10E-06	2.90E-04	Below
PCB <sup>g</sup>		3.30E-03	6.91E-04	1.89E-01	9.39E-02	1.00E+00	Below

Toxic Air Pollutants-Metals <sup>e</sup>	CAS Number	Emission Factor (lb/10 <sup>6</sup> Btu)	Uncontrolled Potential to Emit			IDAPA 88.01.01.0005 PTE Emission Rate vs. SL	
			Emission Rate (Btu/hr)	Emission Rate (Btu/yr)	Emission Rate (ton/yr)	88 - SL (Btu/hr)	Rate vs. SL
Antimony	7440-36-2	4.00E-09	8.37E-10	2.27E-07	1.14E-10	1.60E-08	Below
Beryllium	7440-41-7	3.00E-09	6.28E-10	1.71E-07	8.59E-11	2.10E-08	Below
Cadmium	7440-19-9	3.00E-09	6.28E-10	1.71E-07	8.59E-11	2.10E-08	Below
Chromium	7440-47-3	3.00E-09	6.28E-10	1.71E-07	8.59E-11	2.10E-08	Below
Copper	7440-50-9	6.00E-09	1.26E-09	3.41E-07	1.71E-10	1.50E-08	Below
Lead	7439-92-1	6.00E-09	1.26E-09	3.41E-07	1.71E-10	1.50E-08	Below
Manganese	7439-96-5	6.00E-09	1.26E-09	3.41E-07	1.71E-10	1.50E-08	Below
Mercury	7439-97-4	3.00E-09	6.28E-10	1.71E-07	8.59E-11	1.50E-08	Below
Nickel	7440-02-0	3.00E-09	6.28E-10	1.71E-07	8.59E-11	2.10E-08	Below
Selenium	7782-49-2	1.50E-09	3.14E-10	8.59E-08	4.29E-10	1.50E-08	Below
Zinc	7414-18-2	4.00E-09	8.37E-10	2.27E-07	1.14E-10	3.30E-08	Below

**Notes:**

- <sup>1</sup> Uncontrolled potential emissions are equal to actual emissions.
- <sup>2</sup> Criteria Pollutants, small boilers (EPA AP-42, Section 1.3 Fuel Oil Combustion, Tables 1.3-1 and 1.3-9)
- <sup>3</sup> PM emission factor is assumed to equal PM<sub>10</sub>.
- <sup>4</sup> SO<sub>2</sub> emission factor multiplied by percent sulfur content of fuel (EPA AP-42, Section 1.3 Fuel Oil Combustion, Table 1.3-1)
- <sup>5</sup> TOC emission factor is used to estimate VOCs (EPA AP-42, Section 1.3 Fuel Oil Combustion, Table 1.3-9)
- <sup>6</sup> Toxic Air Pollutants (EPA AP-42, Section 1.3 Fuel Oil Combustion, Table 1.3-9).
- <sup>7</sup> Methyl Chloroform synonym 1,1,1-Trichloroethane
- <sup>8</sup> Polycyclic Organic Matter is the sum of benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(a)pyrene.
- <sup>9</sup> Trace elements from distillate fuel oil combustion sources (EPA AP-42, Section 1.3 Fuel Oil Combustion, Table 1.3-10)

\* **Note:** \$1.1 billion is requested to increase annual natural gas consumption in Bohann Nos. 1, 2, 3, and 4 to 225 million cubic feet per year (Mcf/yr) for operational flexibility. There are four Bohann units rated at the same capacity and certain fire safety parameters.

<b>Order Authority</b>	26.5
<b>Record No.</b>	C0286-796
<b>Fiscal Year</b>	Federal Gov
<b>American Flag (Auto Authority)</b>	2,670.42
<b>American Flag (Spec Authority)</b>	20,349.69
<b>American Operation (Land Priority)</b>	
<b>American Priority (Auto Authority)</b>	1,329
<b>New Value of Fuel (Priority)</b>	425

[illegible]

		Unacetylated Potassium Bitartrate	
Citric Potassium <sup>2</sup>	CAS No.	Estimation Factor (g/mol sec)	Estimation Rate (g/hr)
Total Potassium Bitartrate (TPB) <sup>3</sup>		7.6	0.218
Nitrogen Oxides (NOx)		100.0	2.87
Sulfur Oxides		0.6	0.017
Carbon Monoxide (CO)		84.0	2.41
CO <sub>2</sub>		5.5	0.159

[illegible]

Trade Air Pollutants (mg/m <sup>3</sup> )	CAS Number	Unsubstantiated Potential to Emit				GADA		PTE Potential Ratio vs. EL
		Emission Factor (lb/yr per ton)	Emission Ratio (tons/yr)	Emission Ratio (tons/yr)	Emission Ratio (tons/yr)	SO <sub>2</sub> - EL (lb/yr)		
Acetylene	7440-39-2	2.00E-04	5.77E-08	2.49E-02	1.22E-06	1.90E-06	Exempted	
Benzene	7440-36-2	4.40E-03	1.70E-04	6.41E-01	2.72E-04	3.30E-02	Exempt	
Benzonitrile	7440-31-7	1.40E-03	3.40E-07	1.40E-02	7.28E-07	2.60E-02	Exempt	
Bromobenzene	7440-43-8	1.00E-03	3.70E-05	1.35E-01	6.77E-05	3.70E-05	Exempted	
Chlorobenzene	7440-47-3	1.40E-03	4.00E-05	1.72E-01	8.81E-06	6.60E-07	Exempted	
Chloroform	7440-48-4	8.40E-05	2.41E-08	1.00E-02	8.37E-08	3.30E-02	Exempt	
Gasoline	7440-40-4	8.40E-04	2.44E-05	2.44E-01	6.82E-05	1.30E-05	Exempt	
Hexachlorobenzene	7440-49-5	3.80E-04	1.07E-08	4.87E-02	2.34E-05	0.70E-02	Exempt	
Mercury	7439-97-4	2.60E-04	7.47E-08	3.30E-02	1.00E-05	1.00E-05	Exempt	
Methylbenzene	7438-96-2	1.10E-03	3.10E-06	1.88E-01	6.77E-06	3.35E-01	Exempt	
Nitrobenzene	7440-42-4	2.10E-03	6.00E-07	2.68E-01	1.20E-04	2.70E-02	Exempted	
Styrene	7440-48-2	2.40E-03	8.88E-07	2.68E-01	1.48E-05	1.30E-02	Exempt	
Toluene	7440-48-1	2.30E-03	6.81E-06	2.68E-01	1.41E-04	3.00E-03	Exempt	
Verbenes	7440-69-8	4.00E-03	1.19E-01	4.90E-02	2.49E-01	3.35E-01	Exempt	

<sup>1</sup> Uncontrolled potential emissions are equal to actual emissions.<sup>2</sup> Criteria Pollutants, small uncontrolled boilers (EPA AP-42, Section 1.4 Natural Gas Combustion, Tables 1.4-1 and 1.4-2)

**3. PM estimation factor is assumed to equal PM<sub>10</sub>**

**Appendix A: Data from the 1990 Census of the United States**

**16 USC 4071(a)(1) AND (2), SECTION 1.4 REGULATIONS CONCERNING CONSPIRACY, (AND 1.4-3).**

\* **Inputs from Natural Gas Combustion (EPA AP-42, Section 1.4 Natural Gas Combustion, Table 1.4-4)**

# **St. Luke's Regional Medical Center - Boise (Generator #1)**

Generator Name	900 Kw
Model No.	D300
Engine Power Rating (kW)	900
Engine Power Rating (hp)	1,207
Fuel Type	Distillate #2
- maximum sulfur content	0.50%
Maximum Firing Rate (cals/hr)	NA
Maximum Heat Input Rating (Btu/hr)	3,074,360
Maximum Hours of Operation	500
Maximum Firing Rate (cals/hr)	
Annual Operation Limit (hrs/yr)	148
Annual Firing Rate (cals/hr)	
Heat Value of Fuel (Btu/gal)	140,000

Assume: 1 hp = 2547.1 Btu/hr

Increase is from 90 hrs/yr to 208 hrs/yr

Pollutant	CAS No.	Emission Factor (lb/hp-hr)	Uncontrolled Potential to Emit			Controlled Potential to Emit <sup>d</sup>		
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM) <sup>1</sup>			0.80	252	0.13	0.80	74.44	0.037
Nitrogen Oxides (NOx)			26.89	13,445	6.72	26.89	3,980	1.99
Sulfur Oxides <sup>2</sup>		0.0040	4.88	2,441	1.22	4.88	723	0.36
Carbon Monoxide (CO)			1.84	920	0.46	1.84	272.32	0.136
HC <sup>3</sup>			0.09	45	0.02	0.09	13.32	0.01

Compound	CAS Number	Emission Factor (lb/MMBtu)	Uncontrolled Potential to Emit			Controlled Potential to Emit		
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Benzene	71-43-2	7.76E-04	2.39E-03	1.19E+00	5.96E-04	2.39E-03	3.53E-01	1.77E-04
Formaldehyde	50-00-0	7.89E-06	2.43E-04	1.21E-01	6.06E-05	2.43E-04	3.59E-02	1.79E-05
Naphthalene	91-20-3	1.30E-04	4.00E-04	2.00E-01	9.99E-05	4.00E-04	5.92E-02	2.98E-05
Toluene	108-88-3	2.81E-04	8.64E-04	4.32E-01	2.18E-04	8.64E-04	1.28E-01	6.39E-05
o-Xylenes	1330-20-7	1.93E-04	5.63E-04	2.97E-01	1.48E-04	5.63E-04	8.78E-02	4.39E-05
Acenaphthene	83-32-9	4.68E-06	1.44E-06	7.19E-03	3.60E-06	1.44E-06	2.13E-03	1.06E-06
Acenaphthylene	203-99-9	9.23E-06	2.84E-06	1.42E-02	7.09E-06	2.84E-06	4.20E-03	2.10E-06
Anthracene	120-12-7	1.23E-06	3.78E-06	1.89E-03	9.45E-07	3.78E-06	5.60E-04	2.80E-07
Benz(a)anthracene	56-56-3	6.22E-07	1.91E-06	9.56E-04	4.78E-07	1.91E-06	2.83E-04	1.42E-07
Benzo(b)fluoranthene	206-99-2	1.11E-06	3.41E-06	1.71E-03	8.53E-07	3.41E-06	5.06E-04	2.53E-07
Benzo(k)fluoranthene	206-92-3	2.18E-07	6.70E-07	3.35E-04	1.68E-07	6.70E-07	9.92E-06	4.96E-08
Benzo(g,h,i)perylene	191-24-2	5.59E-07	1.71E-06	8.56E-04	4.27E-07	1.71E-06	2.53E-04	1.26E-07
Chrysene	218-01-9	1.53E-06	4.70E-06	2.35E-03	1.18E-06	4.70E-06	6.96E-04	3.48E-07
Dibenzo(a,h)anthracene	53-70-3	3.48E-07	1.08E-06	5.32E-04	2.68E-07	1.08E-06	1.57E-04	7.67E-08
Indeno(1,2,3-cd)pyrene	193-39-5	4.14E-07	1.27E-06	6.36E-04	3.19E-07	1.27E-06	1.88E-04	9.42E-08
Benzo(a)pyrene	50-32-8	2.57E-07	7.90E-07	3.95E-04	1.99E-07	7.90E-07	1.17E-04	5.85E-08
Total PAHs			1.55E-06	7.77E-03	3.86E-06	1.55E-06	2.30E-03	1.15E-06
Fluoranthene	206-44-0	4.03E-06	1.24E-06	6.19E-03	3.10E-06	1.24E-06	1.83E-03	9.17E-07
Fluorene	89-73-7	1.28E-06	3.94E-06	1.97E-02	9.84E-06	3.94E-06	5.82E-03	2.91E-06
Phenanthrene	85-01-8	4.08E-06	1.26E-04	6.27E-02	3.14E-05	1.26E-04	1.86E-02	9.28E-06
Pyrene	129-00-0	3.71E-06	1.14E-06	5.70E-03	2.85E-06	1.14E-06	1.69E-03	8.44E-07
Propylene		2.79E-03	8.58E-03	4.29E+00	2.14E-03	8.58E-03	1.27E+00	6.35E-04
Acetaldehyde		2.52E-06	7.75E-06	3.87E-02	1.94E-05	7.75E-06	1.15E-02	5.73E-06
Acrolein		7.88E-06	2.42E-06	1.21E-02	6.08E-06	2.42E-06	3.59E-03	1.79E-06

Generator emissions data supplied by Western States CAT. Emission factors were utilized to estimate emissions for particulate matter (PM), oxides of nitrogen (NOx), carbon monoxide (CO), and hydrocarbons (HC) in lieu of volatile organic compounds (VOCs).

<sup>1</sup> PM emission factor is assumed to equal PM<sub>10</sub>.

<sup>2</sup> SO<sub>2</sub> emission factor multiplied by percent sulfur content of fuel (EPA AP-42 Table 3.4-1)

<sup>3</sup> HC emission factor is used to estimate VOCs.

<sup>4</sup> Controlled average emission rate is limited to 148 hours per year increase.

<sup>5</sup> Polynuclear aromatic hydrocarbons is the sum of benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(a)pyrene

Note: Toxic emission factors derived from EPA AP-42 Tables 3.4-3 and 3.4-4.

# St. Lukes Regional Medical Center - Boise (Generator #2)

Generator Name	1988 100V
Model No.	3412
Engine Power Rating (kW)	1.181
Engine Power Rating (hp)	1.644
Fuel Type	Distillate #2
- minimum sulfur content	0.05%
Maximum Firing Rate (gal/hr)	NA
Maximum Heat Input Rating (Btu/hr)	3,932,722
Maximum Hours of Operation	500
Maximum Firing Rate (gal/hr)	
Annual Operation Limit (hr/yr)	148
Annual Firing Rate (gal/yr)	
Heat Value of Fuel (Btu/gal)	140,000

Assume: 1 hp = 2547.1 Btu/hr

Increase is from 60 hr/yr to 208 hr/yr

Pollutant	CAS No.	Emission Factor (grams/hr-hr)	Emission Factor (lb/hr-hr)	Uncontrolled Potential to Emit			Controlled Potential to Emit <sup>1</sup>		
				Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM) <sup>1</sup>		0.180		0.54	272	0.14	0.54	80.53	0.040
Nitrogen Oxides (NOx)		10.85		38.90	18,450	9.22	38.90	5,461	2.73
Sulfur Oxides <sup>2</sup>			0.0040	6.25	3,123	1.86	6.25	924	0.46
Carbon Monoxide (CO)		1.23		4.18	2,082	1.05	4.18	619.10	0.31
HC <sup>3</sup>		0.38		1.22	612	0.31	1.22	181.20	0.091

Compound	CAS Number	Emission Factor (lb/1000gal)	Uncontrolled Potential to Emit			Controlled Potential to Emit			IDAPA 58.01.01.3 24/2008 - EL (lb/yr)	FTE Emission Rate vs. EL
			Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)		
Benzene	71-43-2	7.70E-04	3.05E-03	1.63E+00	7.69E-04	3.05E-03	4.62E-01	2.28E-04	8.00E-04	Exceeds
Formaldehyde	50-00-0	7.89E-06	3.10E-04	1.59E-01	7.79E-06	3.10E-04	4.66E-02	2.30E-05	6.10E-04	Below
Naphthalene	91-20-3	1.30E-04	5.11E-04	2.68E-01	1.28E-04	5.11E-04	7.67E-02	3.78E-05	3.33E+00	Below
Toluene	108-98-3	2.81E-04	1.11E-03	5.63E-01	2.78E-04	1.11E-03	1.64E-01	8.18E-05	2.60E+01	Below
o-Xylenes	1330-20-7	1.83E-04	7.59E-04	3.80E-01	1.80E-04	7.59E-04	1.12E-01	5.62E-05	2.90E+01	Below
Acenaphthene	83-32-9	4.69E-06	1.84E-06	9.20E-03	4.60E-06	1.84E-06	2.72E-03	1.39E-09	#N/A	#N/A
Acenaphthylene	203-99-9	9.23E-06	3.69E-06	1.81E-02	9.07E-06	3.69E-06	5.37E-03	2.89E-09	#N/A	#N/A
Anthracene	120-12-7	1.23E-05	4.84E-06	2.42E-03	1.21E-05	4.84E-06	7.16E-04	3.59E-07	#N/A	#N/A
Benz(a)anthracene	88-55-3	6.22E-07	2.45E-08	1.22E-03	6.12E-07	2.45E-08	3.82E-04	1.81E-07	#N/A	#N/A
Benz(b)fluoranthene	206-96-2	1.11E-06	4.37E-08	2.18E-03	1.08E-06	4.37E-08	6.46E-04	3.23E-07	#N/A	#N/A
Benz(k)fluoranthene	206-96-3	2.18E-07	8.67E-07	4.29E-04	2.14E-07	8.67E-07	1.27E-04	6.34E-09	#N/A	#N/A
Benz(o,h)perylene	191-24-3	5.69E-07	2.19E-08	1.09E-03	6.47E-07	2.19E-08	3.24E-04	1.62E-07	#N/A	#N/A
Chrysene	218-01-9	1.63E-06	6.02E-08	3.01E-03	1.60E-06	6.02E-08	8.91E-04	4.48E-07	#N/A	#N/A
Dibenz(a,h)anthracene	53-70-3	3.45E-07	1.30E-08	6.60E-04	3.40E-07	1.30E-08	2.01E-04	1.01E-07	#N/A	#N/A
Indeno(1,2,3-cd)pyrene	193-38-6	4.14E-07	1.63E-08	8.14E-04	4.07E-07	1.63E-08	2.41E-04	1.20E-07	#N/A	#N/A
Benz(a)pyrene	50-32-6	2.67E-07	1.01E-08	5.05E-04	2.63E-07	1.01E-08	1.60E-04	7.48E-08	#N/A	#N/A
Total PAHs			1.98E-06	9.84E-03	4.97E-06	1.98E-06	2.94E-03	1.47E-06	2.00E-08	Exceeds
Fluoranthene	206-44-0	4.03E-06	1.60E-06	7.92E-03	3.89E-06	1.60E-06	2.36E-03	1.17E-06	#N/A	#N/A
Fluorene	89-73-7	1.23E-06	5.09E-08	2.52E-02	1.20E-06	5.09E-08	7.45E-03	3.73E-08	#N/A	#N/A
Phenanthrene	85-01-8	4.08E-06	1.60E-04	8.02E-02	4.01E-06	1.60E-04	2.37E-02	1.18E-06	#N/A	#N/A
Pyrene	129-00-0	3.71E-06	1.46E-06	7.30E-03	3.66E-06	1.46E-06	2.16E-03	1.08E-06	#N/A	#N/A
Propylene		2.79E-03	1.10E-02	5.49E+00	2.74E-03	1.10E-02	1.62E+00	8.12E-04	#N/A	#N/A
Acetaldehyde		2.62E-05	9.91E-05	4.99E-03	2.49E-05	9.91E-05	1.47E-02	7.33E-09	3.00E-03	Below
Acrolein		7.69E-08	3.10E-08	1.64E-02	7.78E-08	3.10E-08	4.69E-03	2.29E-08	1.70E-02	Below

Generator emissions data supplied by Western States CAT. Emission factors were utilized to estimate emissions for particulate matter (PM), oxides of nitrogen (NOx), carbon monoxide (CO), and hydrocarbons (HC) in lieu of volatile organic compounds (VOCs).

<sup>1</sup> PM emission factor is assumed to equal PM<sub>10</sub>.

<sup>2</sup> SO<sub>2</sub> emission factor multiplied by percent sulfur content of fuel (EPA AP-42 Table 3.4-1)

<sup>3</sup> HC emission factor is used to estimate VOCs.

<sup>4</sup> Controlled average emission rate is limited to 148 hours per year increases.

<sup>5</sup> Polynuclear aromatic hydrocarbons is the sum of benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a,h)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(a)pyrene

Note: Toxic emission factors derived from EPA AP-42 Tables 3.4-3 and 3.4-4.

# **St. Luke's Regional Medical Center - Roles (Generator #3)**

Generator Name	2000 Kw
Model No.	3816
Engine Power Rating (kW)	2,038
Engine Power Rating (hp)	2,841
Fuel Type	Distillate #2
- maximum sulfur content	0.50%
Maximum Firing Rate (gal/hr)	137.6
Maximum Heat Input Rating (Btu/hr)	19,284,000
Maximum Hours of Operation	600
Maximum Firing Rate (gal/hr)	68,800
Annual Operation Limit (hr/yr)	148
Annual Firing Rate (gal/hr)	20,385
Heat Value of Fuel (Btu/gal)	140,000

increase is from 60 hr/yr to 208 hr/yr

Pollutant	CAS No.	Emission Factor (lb/MMBtu)	Uncontrolled Potential to Emit			Controlled Potential to Emit <sup>4</sup>		
			Emission Rate <sup>1</sup> (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM) <sup>2</sup>			6.68	290	0.15	0.58	55.84	0.043
Nitrogen Oxides (NOx)			88.84	43,470	21.74	88.84	12,867	6.43
Sulfur Oxides <sup>3</sup>		0.51	9.73	4,884	2.43	9.73	1,440	0.72
Carbon Monoxide (CO)			8.44	4,720	2.38	9.44	1,387.12	0.70
HC <sup>4</sup>			1.44	720	0.36	1.44	213.12	0.107

Compound	CAS Number	Emission Factor (lb/MMBtu)	Uncontrolled Potential to Emit			Controlled Potential to Emit			IDAPA 58.01.01.6 56/586 - EL (lb/yr)	PTR Emission Rate vs. EL
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)		
Benzene	71-43-2	7.76E-04	1.49E-02	7.47E+00	3.74E-03	1.49E-02	2.21E+00	1.11E-03	8.00E-04	Exceeds
Formaldehyde	50-00-0	7.89E-06	1.52E-03	7.60E-01	3.80E-04	1.52E-03	2.28E-01	1.12E-04	5.10E-04	Exceeds
Naphthalene	91-20-3	1.30E-04	2.60E-03	1.25E+00	6.26E-04	2.60E-03	3.71E-01	1.85E-04	3.33E+00	Below
Toluene	108-98-3	2.81E-04	5.41E-03	2.71E+00	1.35E-03	5.41E-03	8.01E-01	4.01E-04	2.60E+01	Below
o-Xylenes	1330-20-7	1.83E-04	3.72E-03	1.89E+00	9.29E-04	3.72E-03	5.60E-01	2.76E-04	2.90E+01	Below
Acenaphthene	83-32-9	4.68E-06	9.02E-05	4.51E-02	2.25E-05	9.02E-05	1.33E-02	6.97E-09	#N/A	#N/A
Acenaphthylene	203-99-8	9.23E-06	1.78E-04	8.89E-02	4.46E-05	1.78E-04	2.63E-02	1.32E-05	#N/A	#N/A
Anthracene	120-12-7	1.23E-06	2.37E-05	1.18E-02	5.92E-06	2.37E-05	3.61E-03	1.76E-06	#N/A	#N/A
Benz(a)anthracene	56-54-3	6.22E-07	1.20E-05	5.99E-03	3.00E-06	1.20E-05	1.77E-03	8.87E-07	#N/A	#N/A
Benzo(b)fluoranthene	205-99-2	1.11E-06	2.14E-05	1.07E-02	5.35E-06	2.14E-05	3.16E-03	1.58E-06	#N/A	#N/A
Benzo(k)fluoranthene	205-92-3	2.18E-07	4.20E-06	2.10E-03	1.05E-06	4.20E-06	6.22E-04	3.11E-07	#N/A	#N/A
Benzo(a,h)fluoranthene	191-24-2	8.66E-07	1.67E-05	8.36E-03	4.18E-06	1.67E-05	2.49E-03	1.24E-06	#N/A	#N/A
Chrysene	218-01-9	1.63E-06	3.19E-05	1.57E-02	7.37E-06	3.19E-05	4.36E-03	2.18E-06	#N/A	#N/A
Dibenz(a,h)anthracene	53-70-3	3.49E-07	6.67E-06	3.33E-03	1.67E-06	6.67E-06	9.86E-04	4.93E-07	#N/A	#N/A
Indeno(1,2,3-cd)pyrene	193-39-5	4.14E-07	7.98E-06	3.99E-03	1.99E-06	7.98E-06	1.18E-03	5.90E-07	#N/A	#N/A
Benzo(a)pyrene	50-32-8	2.67E-07	4.95E-06	2.48E-03	1.24E-06	4.95E-06	7.33E-04	3.69E-07	#N/A	#N/A
Total PM <sub>10</sub>			9.73E-05	4.87E-02	2.43E-05	9.73E-05	1.44E-02	7.20E-06	2.00E-06	Exceeds
Fluoranthene	208-44-0	4.03E-06	7.78E-05	3.88E-02	1.94E-05	7.78E-05	1.16E-02	6.74E-06	#N/A	#N/A
Fluorene	89-73-7	1.28E-06	2.47E-04	1.23E-01	6.18E-05	2.47E-04	3.65E-02	1.82E-05	#N/A	#N/A
Phenanthrene	85-01-9	4.06E-06	7.89E-05	3.89E-02	1.89E-05	7.89E-05	1.16E-01	5.82E-06	#N/A	#N/A
Pyrene	129-00-0	3.71E-06	7.18E-05	3.67E-02	1.79E-05	7.18E-05	1.08E-02	5.28E-06	#N/A	#N/A
Propylene		2.78E-08	5.37E-02	2.68E+01	1.34E-02	5.37E-02	7.95E+00	3.98E-03	#N/A	#N/A
Acetaldehyde		2.82E-08	4.85E-04	2.42E-01	1.21E-04	4.85E-04	7.19E-02	3.69E-05	3.00E-06	Below
Acrolein		7.88E-09	1.52E-04	7.59E-02	3.80E-05	1.52E-04	2.25E-02	1.12E-05	1.70E-02	Below

Generator emissions data supplied by Western States CAT. Emission factors were utilized to estimate emissions for particulate matter (PM), oxides of nitrogen (NOx), carbon monoxide (CO), and hydrocarbons (HC) in lieu of volatile organic compounds (VOCs).

<sup>1</sup> PM emission factor is assumed to equal PM<sub>10</sub>.

<sup>2</sup> SO<sub>2</sub> emission factor multiplied by percent sulfur content of fuel (EPA AP-42 Table 3.4-1)

<sup>3</sup> HC emission factor is used to estimate VOCs.

<sup>4</sup> Controlled average emission rate is limited to 148 hours per year increase.

<sup>5</sup> Polynuclear aromatic hydrocarbons is the sum of benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a,h)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(a)pyrene

Note: Toxic emission factors derived from EPA AP-42 Tables 3.4-3 and 3.4-4.

# **St. Lukes Regional Medical Center - Boies (Generator #4)**

Generator Name	366 kW
Model No.	3406B
Engine Power Rating (kW)	367 kW
Engine Power Rating (hp)	519
Fuel Type	Diesel #2
- maximum sulfur content	0.50%
Maximum Firing Rate (seals/hr)	25.5
Maximum Heat Input Rating (Btu/hr)	3,710,000
Maximum Hours of Operation	500
Maximum Firing Rate (seals/hr)	13,250
Annual Operation Limit (hrs/yr)	148
Annual Firing Rate (seals/hr)	3,922
Heat Value of Fuel (Btu/gal)	140,000

increase is from 60 hrs/yr to 208 hrs/yr

Pollutant	CAS No.	Emission Factor (lb/hrp-hr)	Uncontrolled Potential to Emit			Controlled Potential to Emit <sup>4</sup>		
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM) <sup>1</sup>		0.0021	2.82	1,410	0.71	2.82	417.36	0.21
Nitrogen Oxides (NOx)			9.23	4,615	2.31	9.23	1,366	0.66
Sulfur Oxides <sup>2</sup>			1.06	532	0.27	1.06	157	0.079
Carbon Monoxide (CO)			9.65	4,825	2.41	9.65	1,428.20	0.71
HC <sup>3</sup>			0.12	60	0.03	0.12	17.76	0.01

Compound	CAS Number	Emission Factor (lb/MMBtu)	Uncontrolled Potential to Emit			Controlled Potential to Emit			IDAPA 58.01.01.5 EL	PTE Emission Rate vs. EL
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)		
Benzene	71-43-2	9.33E-04	3.46E-03	1.73E+00	8.65E-04	3.46E-03	5.12E-01	2.56E-04	8.00E-04	Exceeds
Formaldehyde	50-00-0	1.18E-03	4.36E-03	2.18E+00	1.06E-03	4.36E-03	6.46E-01	3.24E-04	5.10E-04	Exceeds
Naphthalene	91-20-3	8.48E-05	3.15E-04	1.57E-01	7.87E-05	3.15E-04	4.66E-02	2.33E-05	3.35E+00	Below
Toluene	108-88-3	4.08E-04	1.52E-03	7.56E-01	3.70E-04	1.52E-03	2.28E-01	1.12E-04	2.50E+01	Below
o-Xylenes	1330-20-7	2.86E-04	1.06E-03	5.29E-01	2.64E-04	1.06E-03	1.56E-01	7.82E-05	2.90E+01	Below
Acenaphthene	83-32-9	1.42E-06	5.27E-06	2.63E-03	1.32E-06	5.27E-06	7.80E-04	3.90E-07	#N/A	#N/A
Acenaphthylene	203-99-8	5.08E-06	1.88E-05	9.39E-03	4.60E-06	1.88E-05	2.78E-03	1.39E-06	#N/A	#N/A
Anthracene	120-12-7	1.67E-06	6.94E-06	3.47E-03	1.73E-06	6.94E-06	1.03E-03	5.13E-07	#N/A	#N/A
1,2-Benzanthracene	108-90-0	3.91E-06	1.45E-04	7.26E-02	3.63E-06	1.45E-04	2.18E-02	1.07E-06	2.40E-06	Exceeds
Benz(a)anthracene	56-55-3	1.68E-06	6.23E-06	3.12E-03	1.59E-06	6.23E-06	9.22E-04	4.61E-07	#N/A	#N/A
Benz(b)fluoranthene	205-99-2	9.91E-06	3.69E-07	1.84E-04	9.19E-08	3.69E-07	5.44E-05	2.72E-08	#N/A	#N/A
Benz(k)fluoranthene	206-82-3	1.66E-07	6.76E-07	2.66E-04	1.44E-07	6.76E-07	8.51E-05	4.26E-08	#N/A	#N/A
Benz(g,h,i)perylene	191-24-2	4.69E-07	1.81E-06	9.07E-04	4.84E-07	1.81E-06	2.69E-04	1.34E-07	#N/A	#N/A
Chrysene	218-01-9	3.63E-07	1.31E-06	6.56E-04	3.27E-07	1.31E-06	1.94E-04	9.69E-08	#N/A	#N/A
Dibenz(a,h)anthracene	53-70-3	5.93E-07	2.16E-06	1.08E-03	6.41E-07	2.16E-06	3.20E-04	1.60E-07	#N/A	#N/A
Indeno(1,2,3-cd)pyrene	189-39-6	3.78E-07	1.39E-06	6.96E-04	3.48E-07	1.39E-06	2.09E-04	1.03E-07	#N/A	#N/A
Benz(a)pyrene	50-32-9	1.89E-07	6.97E-07	3.49E-04	1.74E-07	6.97E-07	1.03E-04	5.16E-08	#N/A	#N/A
Total PAH <sup>5</sup>			1.49E-05	7.28E-03	3.84E-06	1.49E-05	2.15E-03	1.08E-06	2.00E-06	Exceeds
Fluoranthene	209-44-0	7.61E-06	2.82E-05	1.41E-02	7.09E-06	2.82E-05	4.19E-03	2.09E-06	#N/A	#N/A
Fluorene	86-72-7	2.92E-06	1.08E-04	5.43E-02	2.71E-06	1.08E-04	1.60E-02	8.02E-06	#N/A	#N/A
Phenanthrene	85-01-8	2.94E-06	1.08E-04	5.45E-02	2.73E-06	1.08E-04	1.61E-02	8.07E-06	#N/A	#N/A
Pyrene	129-00-0	4.78E-06	1.77E-06	8.87E-03	4.43E-06	1.77E-06	2.62E-03	1.31E-06	#N/A	#N/A
Propylene		2.69E-06	9.67E-06	4.79E+00	2.39E-06	9.67E-06	1.42E+00	7.06E-04	#N/A	#N/A
Acetaldehyde		7.67E-04	2.85E-03	1.42E+00	7.11E-04	2.85E-03	4.21E-01	2.11E-04	3.00E-03	Below
Acrolein		9.25E-05	3.43E-04	1.72E-01	6.59E-05	3.43E-04	5.09E-02	2.54E-06	1.70E-02	Below

Generator emissions data supplied by Western States CAT. Emission factors were utilized to estimate emissions for particulate matter (PM), oxides of nitrogen (NOx), carbon monoxide (CO), and hydrocarbons (HC) in lieu of volatile organic compounds (VOCs).

<sup>1</sup> PM emission factor is assumed to equal PM<sub>10</sub>.

<sup>2</sup> SO<sub>2</sub> emission factor was utilized from Section 3.3 Gasoline and Diesel Industrial (EPA AP-42 Table 3.3-1)

<sup>3</sup> HC emission factor is used to estimate VOCs.

<sup>4</sup> Controlled average emission rate is limited to 148 hours per year increase.

<sup>5</sup> Polynuclear aromatic hydrocarbons is the sum of benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(a)pyrene

Note: Toxic emission factors derived from EPA AP-42 Table 3.3-2.

# **St. Luke's Regional Medical Center - Roles (Generator #6)**

Generator Name	66 kW
Model No.	3394
Engine Power Rating (kW)	71
Engine Power Rating (hp)	95
Fuel Type	Distillate #2
- maximum sulfur content	0.50%
Maximum Firing Rate (gal/hr)	NA
Maximum Heat Input Rating (Btu/hr)	241,975
Maximum Hours of Operation	500
Maximum Firing Rate (gal/hr)	
Annual Operation Limit (hrs/yr)	145
Annual Firing Rate (gal/yr)	
Heat Value of Fuel (Btu/gal)	140,000

Assume: 1 hp = 2547.1 Btu/hr

Increase is from 80 hrs/yr to 208 hrs/yr

Pollutant	CAS No.	Emission Factor (gram/hr)	Emission Factor (lb/hr-hp)	Uncontrolled Potential to Emit			Controlled Potential to Emit <sup>4</sup>		
				Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM) <sup>1</sup>		43		0.08	47	0.02	0.08	14.02	0.007
Nitrogen Oxides (NOx)		1,297		2.88	1,428	0.71	2.88	423	0.21
Sulfur Oxides <sup>2</sup>			0.0021	0.19	97	0.05	0.19	29	0.014
Carbon Monoxide (CO)		1,057		2.33	1,184	0.58	2.33	344.57	0.172
HC <sup>3</sup>		123		0.27	135	0.07	0.27	40.10	0.02

Compound	CAS Number	Emission Factor (lb/MMBtu)	Uncontrolled Potential to Emit			Controlled Potential to Emit			IDAPA 5/5/98 - EL	PTE Emission Rate vs. EL
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)		
Benzene	71-43-2	9.33E-04	2.28E-04	1.13E-01	5.84E-08	2.28E-04	3.34E-02	1.87E-05	6.00E-04	Below
Formaldehyde	50-00-0	1.18E-09	2.88E-04	1.43E-01	7.14E-05	2.88E-04	4.23E-02	2.11E-05	6.10E-04	Below
Naphthalene	91-20-3	8.48E-05	2.05E-05	1.03E-02	5.18E-08	2.05E-05	3.04E-03	1.52E-05	3.33E+00	Below
Toluene	108-98-3	4.08E-04	9.90E-05	4.95E-02	2.47E-05	9.90E-05	1.48E-02	7.32E-05	2.50E+01	Below
o-Xylenes	1330-20-7	2.89E-04	6.90E-05	3.45E-02	1.72E-05	6.90E-05	1.02E-02	5.10E-05	2.90E+01	Below
Acenaphthene	83-32-9	1.42E-06	3.44E-07	1.72E-04	8.69E-09	3.44E-07	5.09E-05	2.54E-08	#N/A	#N/A
Acenaphthylene	203-98-8	5.09E-06	1.22E-06	6.12E-04	3.06E-07	1.22E-06	1.81E-04	9.08E-08	#N/A	#N/A
Anthracene	120-12-7	1.87E-06	4.52E-07	2.26E-04	1.13E-07	4.52E-07	6.70E-05	3.35E-08	#N/A	#N/A
1,3-Butadiene	106-99-0	3.91E-05	9.48E-05	4.73E-03	2.37E-05	9.48E-05	1.40E-03	7.00E-07	2.40E-05	Below
Benz(a)anthracene	95-55-3	1.88E-06	4.07E-07	2.03E-04	1.02E-07	4.07E-07	6.02E-05	3.01E-08	#N/A	#N/A
Benzo(b)fluoranthene	205-99-2	9.91E-06	2.40E-06	1.20E-03	5.99E-09	2.40E-06	3.59E-05	1.77E-08	#N/A	#N/A
Benzo(k)fluoranthene	205-92-3	1.85E-07	3.79E-08	1.89E-05	9.38E-09	3.79E-08	5.59E-06	2.79E-09	#N/A	#N/A
Benzo(a,h)fluoranthene	191-24-2	4.89E-07	1.18E-07	5.92E-05	2.96E-08	1.18E-07	1.79E-05	8.78E-09	#N/A	#N/A
Chrysene	218-01-9	3.53E-07	8.64E-08	4.27E-05	2.14E-08	8.64E-08	1.29E-05	6.32E-09	#N/A	#N/A
Dibenz(a,h)anthracene	53-70-3	5.53E-07	1.41E-07	7.05E-05	3.53E-08	1.41E-07	2.09E-05	1.04E-08	#N/A	#N/A
Indeno(1,2,3-cd)pyrene	183-39-5	3.79E-07	9.07E-08	4.54E-05	2.27E-08	9.07E-08	1.34E-05	6.71E-09	#N/A	#N/A
Benzo(a)pyrene	50-32-6	1.89E-07	4.69E-08	2.27E-05	1.14E-08	4.69E-08	6.73E-06	3.37E-09	#N/A	#N/A
Total PAH <sup>5</sup>			9.48E-07	4.73E-04	2.37E-07	9.48E-07	1.40E-04	7.02E-08	2.00E-09	Below
Fluoranthene	205-44-0	7.81E-06	1.94E-06	9.21E-04	4.60E-07	1.94E-06	2.73E-04	1.39E-07	#N/A	#N/A
Fluorene	86-73-7	2.92E-05	7.07E-06	3.53E-03	1.77E-05	7.07E-06	1.05E-03	5.23E-07	#N/A	#N/A
Phenanthrene	85-01-6	2.94E-05	7.11E-06	3.55E-03	1.78E-05	7.11E-06	1.05E-03	5.23E-07	#N/A	#N/A
Pyrene	129-00-0	4.79E-06	1.16E-06	5.78E-04	2.89E-07	1.16E-06	1.71E-04	8.56E-09	#N/A	#N/A
Propylene		2.59E-09	6.24E-04	3.12E-01	1.56E-04	6.24E-04	9.24E-02	4.82E-05	#N/A	#N/A
Acetaldehyde		7.57E-04	1.88E-04	9.28E-02	4.64E-05	1.88E-04	2.75E-02	1.37E-05	3.00E-03	Below
Acrolein		9.25E-05	2.24E-05	1.12E-02	5.60E-05	2.24E-05	3.31E-03	1.66E-05	1.70E-02	Below

Generator emissions data supplied by Western States CAT. Emission factors were utilized to estimate emissions for particulate matter (PM), oxides of nitrogen (NOx), carbon monoxide (CO), and hydrocarbons (HC) in lieu of volatile organic compounds (VOCs).

<sup>1</sup> PM emission factor is assumed to equal PM<sub>10</sub>.

<sup>2</sup> SO<sub>2</sub> emission factor was utilized from Section 3.3 Gasoline and Diesel Industrial (EPA AP-42 Table 3.3-1)

<sup>3</sup> HC emission factor is used to estimate VOCs.

<sup>4</sup> Controlled average emission rate is limited to 148 hours per year increase.

<sup>5</sup> Polynuclear aromatic hydrocarbons is the sum of benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(a)pyrene

Note: Toxic emission factors derived from EPA AP-42 Table 3.3-2.

**St. Lukes Regional Medical Center - Boise (Generator #2)**

Generator Name	108 MW
Model No.	3384
Engine Power Rating (kW)	105
Engine Power Rating (hp)	140.8
Fuel Type	Distillate #2
- maximum sulfur content	0.50%
Maximum Firing Rate (gal/hr)	NA
Maximum Heat Input Rating (Btu/hr)	358,632
Maximum Hours of Operation	800
Maximum Firing Rate (gal/hr)	
Annual Operation Limit (hr/yr)	148
Annual Firing Rate (gal/hr)	
Heat Value of Fuel (Btu/gal)	140,000

Assume: 1 hp = 254.71 Btu/hr

Increases from 68 hr/yr to 268 hr/yr

Pollutant	CAS No.	Emission Factor <sup>1</sup> (lb/hr-hr)	Uncontrolled Potential to Emit			Controlled Potential to Emit <sup>2</sup>		
			Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)
Total Particulate Matter (PM-10)		0.0022	0.31	166	0.08	0.31	45.84	0.023
Nitrogen Oxides (NOx)		0.031	4.38	2,182	1.08	4.38	646	0.32
Sulfur Oxides <sup>3</sup>		0.0021	0.29	144	0.07	0.29	43	0.021
Carbon Monoxide (CO)		0.0067	0.84	472	0.24	0.84	136.82	0.07
TOC Exhaust		0.003	0.35	178	0.09	0.35	52.10	0.03

Compound	CAS Number	Emission Factor (lb/1000Btu)	Uncontrolled Potential to Emit			Controlled Potential to Emit			IDAPA 68.01.01.5 68/688 - SL (lb/yr)	PTE Emission Rate vs. SL
			Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)	Emission Rate (lb/yr)		
Benzene	71-43-2	6.33E-04	3.35E-04	1.67E-01	8.37E-06	3.35E-04	4.69E-02	2.48E-06	8.00E-04	Below
Formaldehyde	50-00-0	1.18E-03	4.23E-04	2.12E-01	1.08E-04	4.23E-04	6.29E-02	3.13E-06	5.10E-04	Below
Naphthalene	91-20-3	8.48E-06	3.04E-06	1.52E-02	7.60E-06	3.04E-06	4.50E-03	2.25E-08	3.33E+00	Below
Toluene	108-98-3	4.09E-04	1.47E-04	7.33E-02	3.67E-06	1.47E-04	2.17E-02	1.09E-06	2.80E+01	Below
p-Xylene	1330-20-7	2.85E-04	1.02E-04	5.11E-02	2.69E-06	1.02E-04	1.51E-02	7.59E-08	2.90E+01	Below
Acenaphthene	83-32-9	1.42E-06	5.09E-07	2.59E-04	1.27E-07	5.09E-07	7.64E-06	3.77E-08	#N/A	#N/A
Acenaphthylene	209-98-9	5.08E-06	1.81E-06	9.07E-04	4.54E-07	1.81E-06	2.69E-04	1.34E-07	#N/A	#N/A
Anthracene	120-12-7	1.67E-06	6.71E-07	3.35E-04	1.69E-07	6.71E-07	9.93E-06	4.99E-08	#N/A	#N/A
1,3-Butadiene	106-99-0	3.91E-06	1.40E-06	7.01E-03	3.51E-06	1.40E-06	2.09E-03	1.04E-08	2.40E-06	Below
Benz(a)anthracene	56-56-3	1.68E-08	6.03E-07	3.01E-04	1.51E-07	6.03E-07	8.92E-06	4.46E-08	#N/A	#N/A
Benzo(b)fluoranthene	208-98-2	9.91E-09	3.55E-08	1.79E-06	8.89E-09	3.55E-08	5.23E-06	2.63E-08	#N/A	#N/A
Benzo(k)fluoranthene	208-82-3	1.55E-07	5.55E-08	2.79E-06	1.39E-08	5.55E-08	8.23E-06	4.11E-09	#N/A	#N/A
Benzo(a,h)perylene	191-24-2	4.69E-07	1.73E-07	8.77E-06	4.39E-09	1.73E-07	2.69E-06	1.30E-08	#N/A	#N/A
Chrysene	218-01-9	3.53E-07	1.27E-07	6.39E-06	3.16E-09	1.27E-07	1.87E-06	9.37E-09	#N/A	#N/A
Dibenz(a,h)anthracene	83-70-3	5.63E-07	2.09E-07	1.05E-04	5.23E-08	2.09E-07	3.09E-06	1.59E-08	#N/A	#N/A
Indeno(1,2,3-cd)pyrene	193-39-6	3.78E-07	1.34E-07	6.72E-06	3.39E-09	1.34E-07	1.99E-06	9.95E-09	#N/A	#N/A
Benzo(a)pyrene	50-32-8	1.89E-07	6.74E-08	3.37E-06	1.69E-08	6.74E-08	9.99E-06	4.99E-09	#N/A	#N/A
Total PAH <sup>4</sup>			1.41E-08	7.03E-04	3.52E-07	1.41E-08	2.09E-04	1.04E-07	2.00E-08	Below
Fluoranthene	208-94-0	7.81E-08	2.73E-08	1.36E-06	6.82E-07	2.73E-08	4.04E-04	2.02E-07	#N/A	#N/A
Pyrene	99-73-7	2.92E-06	1.05E-06	5.24E-03	2.62E-06	1.05E-06	1.55E-03	7.75E-07	#N/A	#N/A
Phenanthrene	95-01-9	2.94E-06	1.05E-06	5.27E-03	2.64E-06	1.05E-06	1.56E-03	7.80E-07	#N/A	#N/A
Pyrene	129-00-0	4.79E-06	1.71E-06	8.57E-04	4.29E-07	1.71E-06	2.54E-04	1.27E-07	#N/A	#N/A
Propylene		2.59E-04	8.25E-04	4.63E-01	2.31E-04	8.25E-04	1.37E-01	6.89E-06	#N/A	#N/A
Acetaldehyde		7.67E-04	2.78E-04	1.39E-01	6.89E-06	2.78E-04	4.07E-02	2.04E-08	3.00E-03	Below
Acrolein		9.25E-05	3.32E-05	1.69E-02	8.29E-06	3.32E-05	4.91E-03	2.45E-08	1.70E-02	Below

No CAT emission factors available for this generator. Therefore, emission factors were utilized from Section 3.3 Gasoline and Diesel Industrial Engines (EPA AP-42 Table 3.3-1)

<sup>1</sup> PM emission factor is assumed to equal PM<sub>10</sub>.

<sup>2</sup> SO<sub>2</sub> emission factor was utilized from Section 3.3 Gasoline and Diesel Industrial (EPA AP-42 Table 3.3-1)

<sup>3</sup> Controlled average emission rate is limited to 148 hours per year increases.

<sup>4</sup> Polynuclear aromatic hydrocarbons is the sum of benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a,h)perylene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(a)pyrene

Note: Toxic emission factors derived from EPA AP-42 Table 3.3-2.

**St. Luke's Regional Medical Center - Roles (Generator #7)**

Generator Name	2000 Kw
Model No.	
Engine Power Rating (kW)	2,125.4
Engine Power Rating (hp)	2,882
Fuel Type	Diesel #2
- maximum sulfur content	0.50%
Maximum Firing Rate (cycles/hr)	135.9
Maximum Heat Input Rating (Btu/hr)	19,026,000
Maximum Hours of Operation	500
Maximum Firing Rate (cycles/hr)	67,950
Annual Operation Limit (hrs/yr)	146
Annual Firing Rate (cycles/yr)	20,113
Heat Value of Fuel (Btu/gal)	140,000

Increase is from 60 hrs/yr to 206 hrs/yr

Pollutant	CAS No.	Emission Factor (grams/lb/hr)	Emission Factor (lb/MMBtu)	Uncontrolled Potential to Emit			Controlled Potential to Emit <sup>4</sup>		
				Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)
Total Particulate Matter (PM) <sup>1</sup>		0.053		0.31	187	0.08	0.31	48.34	0.023
Nitrogen Oxides (NOx)		7.83		48.07	22,637	11.27	48.07	8,671	3.34
Sulfur Oxides <sup>2</sup>			0.51	9.61	4,804	2.40	9.61	1,422	0.71
Carbon Monoxide (CO)		0.11		0.65	326	0.16	0.65	98.17	0.048
HC <sup>3</sup>		0.12		0.71	354	0.19	0.71	104.92	0.05

Compound	CAS Number	Emission Factor (lb/MMBtu)	Uncontrolled Potential to Emit			Controlled Potential to Emit			IDAPA 55.01.01.0045 98 - EL	PTE Emission Rate vs. EL
			Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)	Emission Rate (lb/hr)	Emission Rate (lb/yr)	Emission Rate (ton/yr)		
Benzene	71-43-2	7.76E-04	1.49E-02	7.39E+00	3.69E-03	1.49E-02	2.19E+00	1.09E-03	6.00E-04	Exceeds
Permethylnitrobenzene	80-00-0	7.89E-06	1.50E-05	7.51E-01	3.75E-04	1.50E-05	2.22E-01	1.11E-04	6.10E-04	Exceeds
Naphthalene	91-20-3	1.30E-04	2.47E-03	1.24E+00	6.19E-04	2.47E-03	3.69E-01	1.83E-04	3.33E+00	Below
Toluene	108-98-3	2.81E-04	5.35E-03	2.67E+00	1.34E-03	5.35E-03	7.91E-01	3.95E-04	2.50E+01	Below
o-Xylene	1330-20-7	1.93E-04	3.67E-03	1.84E+00	9.19E-04	3.67E-03	5.43E-01	2.72E-04	2.90E+01	Below
Acenaphthene	83-32-9	4.69E-06	8.90E-05	4.45E-02	2.23E-05	8.90E-05	1.32E-02	6.69E-06	#N/A	#N/A
Acenaphthylene	209-98-9	9.23E-06	1.78E-04	8.79E-02	4.39E-05	1.78E-04	2.80E-02	1.30E-05	#N/A	#N/A
Anthracene	120-12-7	1.23E-05	2.34E-05	1.17E-02	5.85E-06	2.34E-05	3.48E-03	1.73E-06	#N/A	#N/A
Benz(a)anthracene	56-55-3	6.22E-07	1.19E-05	5.92E-03	2.96E-06	1.19E-05	1.75E-03	8.76E-07	#N/A	#N/A
Benzo(b)fluoranthene	206-99-2	1.11E-06	2.11E-05	1.05E-02	5.25E-06	2.11E-05	3.13E-03	1.58E-06	#N/A	#N/A
Benzo(k)fluoranthene	206-82-3	2.19E-07	4.15E-05	2.07E-03	1.04E-06	4.15E-05	6.14E-04	3.07E-07	#N/A	#N/A
Benzo(g,h,i)perylene	191-24-2	5.69E-07	1.08E-05	5.29E-03	2.64E-06	1.08E-05	1.67E-03	7.63E-07	#N/A	#N/A
Chrysene	218-01-9	1.63E-06	2.91E-05	1.46E-02	7.29E-06	2.91E-05	4.31E-03	2.15E-06	#N/A	#N/A
Dibenz(a,h)anthracene	53-70-3	3.46E-07	6.59E-06	3.29E-03	1.65E-06	6.59E-06	9.74E-04	4.87E-07	#N/A	#N/A
Indeno(1,2,3-cd)pyrene	193-39-5	4.14E-07	7.89E-06	3.94E-03	1.97E-06	7.89E-06	1.17E-03	5.83E-07	#N/A	#N/A
Benzo(a)pyrene	50-32-6	2.57E-07	4.89E-06	2.44E-03	1.22E-06	4.89E-06	7.24E-04	3.62E-07	#N/A	#N/A
Fluoranthene			8.61E-05	4.31E-02	2.40E-05	8.61E-05	1.42E-02	7.11E-06	2.00E-06	Exceeds
Fluoranthene	206-44-0	4.03E-06	7.67E-05	3.83E-02	1.92E-05	7.67E-05	1.13E-02	5.67E-06	#N/A	#N/A
Fluoranthene	86-73-7	1.29E-05	2.44E-04	1.22E-01	6.09E-05	2.44E-04	3.80E-02	1.80E-05	#N/A	#N/A
Phenanthrene	85-01-8	4.08E-05	7.79E-04	3.89E-01	1.94E-04	7.79E-04	1.15E-01	5.74E-05	#N/A	#N/A
Pyrene	129-00-0	3.71E-06	7.08E-05	3.53E-02	1.76E-05	7.08E-05	1.04E-02	5.22E-06	#N/A	#N/A
Propylene		2.79E-05	5.31E-02	2.65E+01	1.33E-02	5.31E-02	7.99E+00	3.93E-03	#N/A	#N/A
Acetaldehyde		2.52E-05	4.79E-04	2.40E-01	1.20E-04	4.79E-04	7.10E-02	3.65E-05	3.00E-03	Below
Acrolein		7.99E-05	1.50E-04	7.50E-02	3.75E-05	1.50E-04	2.22E-02	1.11E-05	1.70E-02	Below

Generator emissions data supplied by Western States CAT. Emission factors were utilized to estimate emissions for particulate matter (PM), oxides of nitrogen (NOx), carbon monoxide (CO), and hydrocarbons (HC) in lieu of volatile organic compounds (VOCs).

<sup>1</sup> PM emission factor is assumed to equal PM<sub>10</sub>.

<sup>2</sup> SO<sub>2</sub> emission factor multiplied by percent sulfur content of fuel (EPA AP-42 Table 3.4-1)

<sup>3</sup> HC emission factor is used to estimate VOCs.

<sup>4</sup> Controlled average emission rate is limited to 146 hours per year increase.

<sup>5</sup> Polynuclear aromatic hydrocarbons is the sum of benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(a)pyrene

Note: Toxic emission factors derived from EPA AP-42 Tables 3.4-3 and 3.4-4.

**St. Luke's Regional Medical Center - Combined TAPS from Natural Gas and No. 2 Diesel Fuel Increase**

Idaho TAP	CAS Number	Nat. Gas and Fuel Oil Combined Increase Emission Rate (lb/hr)	IDAPA 58.01.01.585/5 PTE Emission 86 - EL Rate vs. EL (lb/hr)	
Benzene	71-43-2	3.92E-02	8.00E-04	Exceeds
Formaldehyde	50-00-0	1.08E-02	5.10E-04	Exceeds
Naphthalene	91-20-3	6.27E-03	3.33E+00	Below
Toluene	108-88-3	1.46E-02	2.50E+01	Below
o-Xylenes	1330-20-7	9.97E-03	2.90E+01	Below
Total PAH <sup>6</sup>		2.46E-04	2.00E-06	Exceeds
Acetaldehyde		4.45E-03	3.00E-03	Exceeds
Acrolein		7.56E-04	1.70E-02	Below
3-Methylchloranthrene	56-49-5	5.17E-08	2.50E-06	Below
Benzo[a]pyrene	50-32-9	1.20E-06	2.00E-06	Exceeds
Hexane	110-54-3	5.17E-02	1.20E+01	Below
Pentane	109-66-0	7.47E-02	1.18E+02	Below
Arsenic	7440-38-2	5.75E-06	1.50E-06	Exceeds
Barium	7440-39-3	1.26E-04	3.30E-02	Below
Beryllium	7440-41-7	3.45E-07	2.80E-05	Below
Cadmium	7440-43-9	3.16E-05	3.70E-06	Exceeds
Chromium	7440-47-3	4.02E-05	5.60E-07	Exceeds
Cobalt	7440-48-4	2.41E-06	3.30E-03	Below
Copper	7440-50-8	2.44E-05	1.30E-02	Below
Manganese	7439-96-5	1.09E-05	6.70E-02	Below
Mercury	7439-97-6	7.47E-06	1.00E-03	Below
Molybdenum	7439-98-7	3.16E-05	3.33E-01	Below
Nickel	7440-02-0	6.03E-05	2.75E-05	Exceeds
Selenium	7782-49-2	6.89E-07	1.30E-02	Below
Vanadium	1314-62-1	6.61E-05	3.00E-03	Below
Zinc	7440-66-6	1.15E-01	3.33E-01	Below

# Emissions Increase Due to Modification of Natural Gas Fired Boiler

Emissions Unit:

Four boilers fired by natural gas

Purpose:

To calculate emissions increase for criteria air pollutants from four natural gas fired boilers

## Source Information

Source:	St. Luke's, Boise
Permit No.:	T2-040014
Facility ID No.	001-00029
Manufacturer	Cleaver Brooks
Model No.:	CB200-700
Fuel:	Natural Gas

Rated Heat Input Rate	25.3 MMBtu/hr	
	0.0007 10 <sup>6</sup> scf/hr	
Total fuel usage:	200 10 <sup>6</sup> scf/yr	
Is the boiler uncontrolled?		Put yes/no here
Is the boiler controlled using low NO <sub>x</sub> burner?		yes
Is the boiler controlled using low NO <sub>x</sub> burner/Flue gas recirculation?		no
Average Gross Heating Value of Natural Gas <sup>1</sup>	1020 MMBtu/10 <sup>6</sup> scf NG	

## Criteria Air Pollutants

	Emissions Factors <sup>1</sup>		Emissions	
	lb/10 <sup>6</sup> scf	lb/MMBtu	lb/hr	T/yr
PM	7.6	7.45E-03	0.22	0.97
PM <sub>10</sub>	7.6	7.45E-03	0.22	0.97
NO <sub>x</sub>	100	9.80E-02	2.87	12.80
CO	84	8.24E-02	2.41	10.75
SO <sub>2</sub>	0.6	5.88E-04	0.02	0.08
VOC	5.5	5.39E-03	0.16	0.70
Lead (Pb)	0.0005	4.90E-07	0.00	0.00

Abbreviations used:

MMBtu	Million British thermal unit
hr	Hours
yr	Years
lb	Pounds of emissions

<sup>1</sup> Compilation of Air Pollutant Emission Factors, AP-42 Section 1.4 Natural Gas Combustion (Rev. 3/98)

# Emissions from Boiler Fired with No. 2 Oil

Emissions Unit:

A boiler fired by No. 2 fuel oil

Purpose:

To calculate emissions for criteria air pollutants, hazardous air pollutants (HAPs), and toxic air pollutants (TAPs) from boiler fired by No. 2 fuel oil

## Source Information

Source:	St. Luke's, Boise
Permit No.:	T2-040014
Facility ID No.	001-00029
Manufacturer	Cleaver Brooks
Model No.:	CB200-700
Fuel:	No.2 Fuel Oil
Fuel Sulfur Content S% (if S% = 1%, then S=1):	0.50%

Rated Heat Input Rate:	29.3 MMBtu/hr
Average Gross Heating Value of No.2 Oil	140 MMBtu/10 <sup>3</sup> gal

## Criteria Air Pollutants

	Emissions Factors		Emissions	
	lb/10 <sup>3</sup> gal	lb/MMBtu	lb/hr	T/yr (4 boilers)
PM, filterable	2	1.43E-02	0.42	
PM, condensable	1.3			
PM <sub>10</sub>	3.3	2.36E-02	0.69	0.48
NO <sub>x</sub>	20	1.43E-01	4.19	2.72
CO	5	3.57E-02	1.06	0.66
SO <sub>2</sub>	71(142S)	5.07E-01	14.86	9.64
VOC	0.566	3.97E-03	0.12	0.08
Lead (Pb)		9.00E-06	0.00	1.71E-04

## HAPs

Emissions	T/yr
TOTAL HAP	7.70E-04

## TAPs

Cas No.	TAPS	Emissions Factors (EFs) <sup>1</sup>	Emissions
		lb/10 <sup>3</sup> MMBtu	lb/hr
50-00-0	Formaldehyde (HAP)	0.05(average of 0.035 - 0.061)	1.41E-06
7440-38-2	Arsenic (HAP)	4	1.17E-04
7440-41-7	Beryllium (HAP)	3	8.79E-06
7440-43-8	Cadmium (HAP)	3	8.79E-06
7440-47-3	Chromium (HAP)	3	8.79E-06
7440-50-8	Copper	6	1.76E-04
7439-96-6	Manganese (HAP)	3	8.79E-06
7439-97-6	Mercury (HAP)	6	1.76E-04
7440-02-0	Nickel (HAP)	3	8.79E-06
7782-49-2	Selenium (HAP)	16	4.40E-04
7440-86-8	Zinc	4	1.17E-04

TAPs/HAPs total:	9.80E-04 T/yr
------------------	---------------

## Abbreviations used:

MMBtu	Million British thermal unit
hr	Hours
yr	Years
lb	Pounds of emissions

<sup>1</sup> Compilation of Air Pollutant Emission Factors, AP-42 Section 1.4 Natural Gas Combustion (Rev. 3/98)

<sup>2</sup> EF in AP-42 is listed as less than (<) the value listed in "Emissions Factors" column.

<sup>3</sup> EL taken from IDAPA 58.01.01.585 or 586. Acceptable ambient concentrations (AAC) taken from IDAPA 58.01.01.585. Acceptable ambient concentrations for carcinogens (AACC) taken from IDAPA 58.01.01.586

# Emissions Increase Due to Modification of Natural Gas Fired Boiler

Emissions Unit: Single boiler fired by natural gas  
 Purpose: To calculate emissions increase for criteria air pollutants, Hazardous Air Pollutants (HAPs), and toxic air pollutants (TAPs) from natural gas fired boiler

## Source Information

Source:	St. Luke's, Boise
Permit No.:	T2-040814
Facility ID No.	001-00029
Manufacturer:	Cleaver Brooks
Model No.:	CB200-700
Fuel:	Natural Gas

Rated Heat Input Rate	28.3 MMBtu/hr	
	0.0007 10 <sup>6</sup> scf/hr	
Fuel usage increase:	38.78 10 <sup>6</sup> scf/yr	
Is the boiler uncontrolled?	yes	Put yes/no here
Is the boiler controlled using low NO <sub>x</sub> burner?	no	
Is the boiler controlled using low NO <sub>x</sub> burner/Flue gas recirculation?	no	
Average Gross Heating Value of Natural Gas <sup>1</sup>	1020 MMBtu/10 <sup>6</sup> scf NG	

## Criteria Air Pollutants

	Emissions Factors		Emissions	
	lb/10 <sup>6</sup> scf	lb/MMBtu	lb/hr	T/yr
PM	7.8	0.0078	0.22	0.12
PM <sub>10</sub>	7.8	0.0078	0.22	0.12
NO <sub>x</sub>	100	0.0990	2.87	1.54
CO	84	0.0824	2.41	1.29
SO <sub>2</sub>	0.8	0.0008	0.02	0.01
VOC	5.5	0.0054	0.16	0.08
LAES (Pd)	0.0006	0.0006	0.00	0.00

## HAPs

Emissions	lb/hr	T/yr
Total HAP	0.064	0.03

## TAPs

Case No.	TAPs	Emissions Factors (EFs) <sup>1</sup>	Emissions
		lb/10 <sup>6</sup> scf <sup>2</sup>	lb/MMBtu
71-43-2	Benzene (HAP)	2.1 E-03	2.06 E-06
80-32-6	Benzo(a)pyrene	1.2 E-06	1.18 E-09
80-00-0	Formaldehyde (HAP)	7.5 E-02	7.35 E-05
110-84-3	Heptane (HAP)	1.8 E+00	1.78 E-03
91-20-3	Naphthalene (HAP)	6.1 E-04	5.98 E-07
108-66-0	Pentane	2.8 E+00	2.55 E-03
108-66-3	Toluene (HAP)	3.4 E-03	3.33 E-06
7440-38-2	Arsenic (HAP)	2.0 E-04	1.98 E-07
7440-39-3	Barium	4.4 E-03	4.31 E-06
7440-41-7	Beryllium (HAP)	1.2 E-06	1.18 E-09
7440-43-8	Cadmium (HAP)	1.1 E-06	1.08 E-09
7440-47-3	Chromium (HAP)	1.4 E-03	1.37 E-06
7440-48-4	Cobalt (HAP)	8.4 E-06	8.24 E-09
7440-50-8	Copper	8.5 E-04	8.33 E-07
7439-98-6	Manganese (HAP)	3.9 E-04	3.75 E-07
7439-97-6	Mercury (HAP)	2.8 E-04	2.55 E-07
7439-98-7	Molybdenum	1.1 E-03	1.08 E-06
7440-02-0	Nickel (HAP)	2.1 E-03	2.06 E-06
7782-49-2	Selenium (HAP)	2.4 E-06	2.35 E-09
7440-82-2	Vanadium <sup>4</sup>	2.3 E-03	2.25 E-06
7440-66-6	Zinc	2.9 E-02	2.84 E-05

TAPs/HAPs total:	0.07 T/yr
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## Abbreviations used:

MMBtu	Million British thermal unit
hr	Hours
yr	Years
lb	Pounds of emissions

<sup>1</sup> Compilation of Air Pollutant Emission Factors, AP-42 Section 1.4 Natural Gas Combustion (Rev. 3/98)

<sup>2</sup> EF in AP-42 is listed as less than (<) the value listed in "Emissions Factors" column.

<sup>4</sup> In IDAPA 58.01.01.586, the EL and AAC is for V (7440-82-2) as V<sub>2</sub>O<sub>5</sub> (1314-63-1). The Vanadium emissions calculated using AP-42 emissions factor is 7.67 x 10<sup>-6</sup> lb/hr. This Vanadium emissions rate is converted to V<sub>2</sub>O<sub>5</sub> by 7.67 x 10<sup>-6</sup> lb/hr of V x (1 lbmol of V<sub>2</sub>O<sub>5</sub>/2 lbmol of V) x (181.86 lb V<sub>2</sub>O<sub>5</sub>/lbmol of V<sub>2</sub>O<sub>5</sub>) / (50.94 lb V/lbmol of V) = 1.37 x 10<sup>-6</sup> lb/hr of V<sub>2</sub>O<sub>5</sub>. The calculated V<sub>2</sub>O<sub>5</sub> rate is compared to EL taken from IDAPA 58.01.0.586.

# TAP Emissions Increase from Modifications to the Four Natural Gas Fired Boilers and and to the Seven Emergency Generators

Emissions Units  
Purpose:

Four boilers and seven generators.  
To sum TAP emissions increase resulting from the modifications to the boilers and to the generators.  
To compare the total TAP increases to its respective EL found in IDAPA 58.01.01.585-595.

## Source Information

Source:	St. Luke's, Boise
Permit No.:	T2-040014
Facility ID No.:	001-00029

## TAPS

Cas No.	TAPS	Emissions from Boilers	Emissions from Generators <sup>1</sup>	Total Emissions	TAP EL (lb/hr)	Emissions ≤ EL (Yes/Exceed) <sup>2</sup>	AAC (mg/m <sup>3</sup> , 24 hours average) <sup>3</sup>	AACC (μg/m <sup>3</sup> , annual average) <sup>3</sup>
71-43-2	Benzene	2.4 E-04	3.92 E-02	3.94E-02	8.00E-04	Exceed		1.2E-01
60-32-8	Benz(a)pyrene	1.4 E-07	1.30 E-05	1.31E-05	2.00E-06	Exceed		3.0E-04
50-00-0	Formaldehyde	8.6 E-03	8.66 E-03	1.73E-02	5.10E-04	Exceed		7.7E-02
110-84-3	Hexane	2.1 E-01	-	2.07E-01	1.20E+01	Yes		9
91-20-3	Heptahedrene	7.0 E-05	6.25 E-03	6.32E-03	3.33E+00	Yes		2.5
100-98-0	Pentane	3.0 E-01	-	2.98E-01	1.18E+02	Yes		88.5
109-66-3	Toluene	3.9 E-04	1.46 E-02	1.49E-02	2.50E+01	Yes	18.75	2.3E-04
7440-38-2	Acetic	2.3 E-05	-	2.3 E-05	1.50E-08	Exceed		0.025
7440-39-3	Barium	5.1 E-04	-	5.1 E-04	3.30E-02	Yes		4.2E-03
7440-41-7	Beryllium	1.4 E-06	-	1.4 E-06	2.80E-05	Yes		5.6E-04
7440-43-8	Cadmium	1.3 E-04	-	1.3 E-04	3.70E-06	Exceed		0.025
7440-47-3	Chromium	1.6 E-04	-	1.6 E-04	3.30E-02	Yes	0.025	
7440-48-4	Cobalt	9.6 E-06	-	9.6 E-06	3.30E-03	Yes	0.0025	
7440-50-8	Copper	9.8 E-05	-	9.8 E-05	1.30E-02	Yes	0.05	
7439-98-6	Manganese	4.4 E-05	-	4.4 E-05	3.33E-01	Yes	0.25	
7439-97-6	Mercury	3.0 E-05	-	3.0 E-05	7.00E-03	Yes	0.005	
7439-98-7	Molybdenum	1.3 E-04	-	1.3 E-04	6.67E-01	Yes	0.5	
7440-02-0	Nickel	2.4 E-04	-	2.4 E-04	2.70E-05	Exceed		4.2E-03
7782-49-2	Selenium	2.8 E-08	-	2.8 E-08	1.30E-02	Yes	0.01	
7440-62-2	Vanadium <sup>4</sup>	4.7 E-04	-	4.7 E-04	3.00E-03	Yes	0.0025	
7440-68-6	Zinc	3.3 E-03	-	3.3 E-03	6.67E-01	Yes	0.5	

<sup>1</sup> Completion of Air Pollutant Emission Factors, AP-42 Section 1.4 Natural Gas Combustion (Rev. 3/89)

<sup>2</sup> EF in AP-42 is listed as less than (<) the value listed in "Emissions Factors" column.

<sup>3</sup> EL taken from IDAPA 58.01.01.585 or 595. Acceptable ambient concentrations (AAC) taken from IDAPA 58.01.01.585. Acceptable ambient concentrations (AACC) taken from IDAPA 58.01.01.585

<sup>4</sup> In IDAPA 58.01.01.585, the EL and AAC is for V (7440-62-2) as V<sub>2</sub>O<sub>5</sub> (1314-62-1). The Vanadium emissions calculated using AP-42 emissions factor is 7.67 x 10<sup>-4</sup> lb/hr. This Vanadium emissions rate is converted to V<sub>2</sub>O<sub>5</sub> by 7.67 x 10<sup>-4</sup> lb/hr of V x (1 lbmol of V<sub>2</sub>O<sub>5</sub>/2 lbmol of V) x (181.08 lb V<sub>2</sub>O<sub>5</sub>/lbmol of V<sub>2</sub>O<sub>5</sub>) / (50.94 lb V/lbmol of V) = 1.37 x 10<sup>-4</sup> lb/hr of V<sub>2</sub>O<sub>5</sub>. The calculated V<sub>2</sub>O<sub>5</sub> rate is compared to EL taken from IDAPA 58.01.0.585.

<sup>5</sup> Data taken from the Tier II OP/PTC Application



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 10**  
1200 Sixth Avenue  
Seattle, WA 98101

Reply To  
Attn Of: AWT - 107

June 16, 2005

Mr. Roger Dean  
Chief Engineer  
St. Luke's Regional Medical Center  
190 East Bannock  
Boise, Idaho 83712

Re: NSPS Subpart Dc Reduction in Fuel Use Record-Keeping Request

Dear Mr. Dean:

This alternative fuel monitoring determination is in response to a request sent to the Environmental Protection Agency (EPA) by St. Luke's Regional Medical Center (SLRMC) dated December 22, 2004. In this request, it is stated that SLRMC operates four 29.3 MMBtu/hour natural gas-fired boilers, located at their facility in Boise, Idaho. Each of these boilers is an affected facility subject to 40 CFR 60 Subpart Dc "Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units" (Subpart Dc) and also subject to certain general requirements of 40 CFR 60 Subpart A.

EPA approves the request from SLRMC for a reduction in the fuel usage record-keeping requirement in 40 CFR §60.48c of Subpart Dc from daily to monthly. EPA also approves the use of one gas meter to record monthly natural gas usage for SLRMC's four boilers. SLRMC states that the four boilers fire natural gas as the primary fuel and are capable of firing diesel fuel as a backup. They also state that there is one gas meter that tracks the natural gas usage of all four boilers combined.

SLRMC requests approval for the use of one natural gas meter to record the natural gas usage for all four boilers. They propose that when more than one boiler is firing natural gas simultaneously, they will divide each boiler design heat input capacity by the total of the design heat input capacities of each boiler, and use this to prorate the natural gas usage of each boiler on a monthly basis. EPA determines that this will adequately determine the natural gas usage by each boiler.

The approval for the reduction in the record keeping to monthly instead of daily is based on a memorandum dated February 20, 1992, from the EPA Office of Air Quality Planning and Standards which states that there is little value in requiring daily record-keeping of the amounts of fuel combusted for an affected unit that fires only natural gas with clean low-sulfur fuel oil (sulfur content less than 0.5%) as a backup. EPA has approved requests for such units to maintain monthly, instead of daily, fuel records.

For units that fire oil there are additional certification requirements that the fuel oil sulfur limits of 0.5% are met. Therefore, EPA's approvals of monthly fuel use record-keeping for units that can fire oil have continued to require semi-annual reporting of excess emissions of the standards for sulfur dioxide, which are in 40 CFR § 60.42c(d) and § 60.42c(h)(1), and required by 40 CFR § 60.48c(d). Those reports must be consistent with the general excess emissions reporting requirements of 40 CFR § 60.7(d).

If you have any further questions or concerns, please contact Heather Valdez of the Region 10 Office of Air, Waste and Toxics at (206) 553-6220 or [valdez.heather@epa.gov](mailto:valdez.heather@epa.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Dan Mey" followed by a flourish and the word "For".

Jeff KenKnight, Manager  
Federal and Delegated Air Programs Unit  
Office of Air, Waste and Toxics

cc: Harbi Elshafei, Idaho Department of Environmental Quality

## **APPENDIX B**

**St. Luke's Regional Medical Center, Boise  
T2-040014**

**Modeling Analysis**

## MODELING MEMORANDUM

**DATE:** February 15, 2005  
**TO:** Harbi Elshafei, Permitting Analyst  
**THROUGH:** Kevin Schilling, Stationary Source Modeling Coordinator *KS*  
**FROM:** Dustin Holloway, Modeling Analyst *DH*  
**PROJECT NUMBER:** T2-040014  
**SUBJECT:** Modeling Review for the St. Luke's Regional Medical Center

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### 1.0 SUMMARY

Atmospheric dispersion modeling of facility-wide emissions was submitted in a Tier II operating permit application to demonstrate that the emissions from St. Luke's Regional Medical Center's (St. Luke's) boilers and emergency generators would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02) while operating at increased daily and annual rates. The modeling analysis demonstrated that the emissions from the facility would not exceed the national ambient air quality standards (NAAQS) for any criteria air pollutant. Additionally, the applicant submitted a toxic pollutant modeling analysis to demonstrate that the toxic pollutant concentrations would not exceed any of the allowable ambient concentration increments in IDAPA 58.01.01.586 for carcinogenic pollutants.

Based on the results of the analyses, DEQ has determined that the submitted modeling analysis demonstrates, to DEQ's satisfaction, that the boilers will not cause or contribute to a violation of any ambient air quality standard. The following table summarizes the key assumptions used in the modeling analysis.

Table 1.1 KEY ASSUMPTIONS	
Assumption	Explanation
Only one boiler can operate on No. 2 fuel oil at a time	This assumption was necessary for the facility to demonstrate compliance with the NAAQS for PM <sub>10</sub> .
The boilers will not burn No. 2 fuel oil for more than 10 hours per day	This is an assumption used by the applicant. No analysis was conducted to demonstrate that the 24-hour SO <sub>2</sub> standard or the 24-hour PM <sub>10</sub> standard would be met if No. 2 fuel oil was burned continuously for 24 hours.
The generators will only operate four hours per day	This assumption was necessary for the facility to demonstrate compliance with the NAAQS for PM <sub>10</sub> .

### 2.0 BACKGROUND INFORMATION

#### **2.1 Applicable Air Quality Impact Limits**

St. Luke's is located in Ada county which is classified as a maintenance area for carbon monoxide (CO), particulate matter with an aerodynamic diameter of less than or equal to a nominal 10 microns (PM<sub>10</sub>), and unclassified for all other criteria pollutants (i.e. VOC, SO<sub>2</sub>, NO<sub>2</sub>, ozone, lead).

Table 2.1 APPLICABLE REGULATORY LIMITS				
Pollutant	Averaging Period	Significant Contribution Levels ( $\mu\text{g}/\text{m}^3$ ) <sup>a,b</sup>	Regulatory Limit ( $\mu\text{g}/\text{m}^3$ ) <sup>c</sup>	Modeled Value Used <sup>d</sup>
PM <sub>10</sub> <sup>e</sup>	Annual	1	50 <sup>f</sup>	Maximum 1 <sup>st</sup> highest <sup>g</sup>
	24-hour	5	150 <sup>h</sup>	Maximum 6 <sup>th</sup> highest <sup>i</sup> Highest 2 <sup>nd</sup> highest <sup>j</sup>
CO	8-hour	500	10,000 <sup>k</sup>	Highest 2 <sup>nd</sup> highest <sup>l</sup>
	1-hour	2000	40,000 <sup>k</sup>	Highest 2 <sup>nd</sup> highest <sup>l</sup>
SO <sub>2</sub>	Annual	1	80 <sup>k</sup>	Maximum 1 <sup>st</sup> highest <sup>l</sup>
	24-hour	5	365 <sup>k</sup>	Highest 2 <sup>nd</sup> highest <sup>l</sup>
	3-hour	25	1,300 <sup>k</sup>	Highest 2 <sup>nd</sup> highest <sup>l</sup>
NO <sub>2</sub>	Annual	1	100 <sup>k</sup>	Maximum 1 <sup>st</sup> highest <sup>l</sup>

<sup>a</sup> IDAPA 58.01.01.006.91  
<sup>b</sup> Micrograms per cubic meter  
<sup>c</sup> IDAPA 58.01.01.577 for criteria pollutants, IDAPA 58.01.01.585 for non-carcinogenic toxic air pollutants IDAPA 58.01.01.586 for carcinogenic toxic air pollutants.  
<sup>d</sup> The maximum 1<sup>st</sup> highest modeled value is always used for significant impact analysis and for all toxic air pollutants.  
<sup>e</sup> Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers  
<sup>f</sup> Never expected to be exceeded in any calendar year.  
<sup>g</sup> Concentration at any modeled receptor.  
<sup>h</sup> Never expected to be exceeded more than once in any calendar year.  
<sup>i</sup> Concentration at any modeled receptor when using five years of meteorological data.  
<sup>j</sup> The highest 2<sup>nd</sup> high is considered to be conservative for five years of meteorological data.  
<sup>k</sup> Not to be exceeded more than once per year.

Table 2.2 TOXIC POLLUTANT REGULATORY LIMITS		
Pollutant	Averaging Period	AACC ( $\mu\text{g}/\text{m}^3$ )
Acetaldehyde	Annual	4.50E-01
Arsenic	Annual	2.30E-04
Benzene	Annual	1.20E-01
Cadmium	Annual	5.60E-04
Formaldehyde	Annual	7.70E-02
Nickel	Annual	4.20E-03
PAH	Annual	3.00E-04

## 2.2 Background Concentrations

The submitted modeling analysis included a full impact analysis for PM<sub>10</sub>, CO, NO<sub>2</sub>, and SO<sub>2</sub>. The background concentrations in Table 2.3 were taken from a memorandum from Rick Hardy to Mary Anderson dated March 14, 2003 regarding background concentrations for new source review dispersion modeling. The background values chosen are for downtown Boise. The PM<sub>10</sub> background value was chosen from an isopleth showing ambient concentrations in downtown Boise. St. Luke's is shown on the map with a background concentration of 95  $\mu\text{g}/\text{m}^3$ . Although there are areas in downtown Boise with higher background concentrations, DEQ determined that the PM<sub>10</sub> background concentration near St. Luke's was appropriate since the maximum impacts occur very close to the St. Luke's facility. The appendix contains an isopleth showing the maximum PM<sub>10</sub> impacts and their location relative to the St. Luke's facility.

Table 2.3 BACKGROUND CONCENTRATIONS.		
Pollutant	Averaging Period	Background concentrations ( $\mu\text{g}/\text{m}^3$ )
PM <sub>10</sub>	24-hour	33.7
	Annual	95
CO	1-hour	6,800
	8-hour	15,600
SO <sub>2</sub>	3-hour	10
	24-hour	40
	Annual	120
NO <sub>2</sub>	Annual	40

### 3.0 ASSESSMENT OF SUBMITTED, CERTIFIED MODELING ANALYSIS

#### 3.1 Modeling Methodology

CH2M Hill conducted dispersion modeling to demonstrate that the emissions from the St. Luke's boilers and emergency generators would not cause or contribute to a violation of any ambient air quality standard. The submitted building input parameters did not include a major portion of the facility's buildings. During the review phase CH2M Hill updated the building parameters file and some of the emissions rates and resubmitted it via email. DEQ reran the model with the updated building and emission parameters submitted by CH2M Hill. The model conservatively assumes that all NO<sub>x</sub> is converted to nitrogen dioxide (NO<sub>2</sub>). The following table summarizes the parameters used in the model.

Table 3.1 MODELING PARAMETERS.		
Parameter	What Facility Submitted	DEQ's Review/Determination
Modeling protocol	A modeling protocol was submitted prior to the permit application	The modeling analysis followed the protocol
Model Selection	ISCPrime	This model is appropriate for this facility because ambient air is located within the downwash cavity region
Meteorological Data	Boise 1987-1991	This is the most representative meteorological data available for this location
Model Options	Regulatory Defaults	Appropriate
Land Use	Urban	This is appropriate for the downtown area of Boise
Complex Terrain	No Complex Terrain	The facility is located on flat terrain and the maximum impacts occur in the downwash regions. Complex terrain does not affect the maximum impacts from this facility
Building Downwash	Downwash was accounted for with the Prime algorithm	This is an appropriate model for this situation
Receptor Network	25 meter grid near facility; 50 meter grid out to 500 meters	This grid layout is appropriate since the maximum concentrations occur so close to the emissions source
Facility Layout	N/A	The facility layout was appropriate.

#### 3.2 Emission Rates

The following tables summarize the criteria and toxic pollutant rates used in the model to demonstrate compliance with the applicable ambient standards. The rates shown are the average hourly rates over the particular averaging period.

Table 3.2 EMISSION RATES FOR EACH CRITERIA POLLUTANT OVER EACH AVERAGING PERIOD.							
	CO maximum rates	NO <sub>x</sub> Annual	PM <sub>10</sub> annual	PM <sub>10</sub> 24-hr	SO <sub>2</sub> annual	SO <sub>2</sub> 3-hr	SO <sub>2</sub> 24-hr
Generator No. 1	1.84	0.64	0.012	0.50	0.12	4.88	4.88
Generator No. 2	4.18	0.88	0.013	0.54	0.15	6.25	6.25
Generator No. 3	9.44	2.06	0.014	0.58	0.23	9.73	9.73
Generator No. 4	9.65	0.22	0.067	2.82	0.025	1.06	1.06
Generator No. 5	2.33	0.068	0.0022	0.095	0.0046	0.19	0.19
Generator No. 6	0.94	0.10	0.0074	0.31	0.0069	0.29	0.29
Generator No. 7	0.65	1.07	0.0074	0.31	0.23	9.61	9.61
Representative Boiler No. 1	2.41	3.07	0.248	0.22	2.22	14.86	6.20
Representative Boiler No. 2	2.41	0.47	0.036	0.22	0.0028	NA	0.010

The emissions estimates for each pollutant are average rates over the particular averaging period. Since all four of the boilers have the same operating characteristics and are located near each other their emissions were represented in the model as two stacks to reduce model input parameters. The emissions from different operating scenarios (i.e. burning fuel oil for part of the day and natural gas for the remainder) were summed and entered into the model as if they came from one stack. For annual concentration estimates the emissions from the first representative boiler accounts for the emissions from 1,298 hours of No. 2 fuel oil use and 7,462 hours of natural gas use. The applicant requested the equivalent of 8,900 hours per year of natural gas use between the four boilers. The second representative boiler accounts for the remaining 7,462 hours of natural gas use not accounted for with the other representative boiler. The total emissions from each source were accounted for. Since the rates in the model are averages they should not be used as short term permit limits. The fuel use restrictions in the application materials should be used as permit limits to assure compliance with the annual ambient air quality standards.

The emissions rates used for 24-hour standards are the average rates from 10 hours of No. 2 oil use and 14 hours of natural gas use in the first representative boiler, and the average rate from 14 hours of natural gas combustion in the second representative boiler. This accounts for the 10 hours that the permittee is allowed to combust fuel oil per day plus 14 additional hours for two boilers combusting natural gas. The rates used in the model should not be used as short term permit limits because they are averages over a 24-hour period for multiple units. The requirement that only one boiler be operating when No. 2 fuel oil is used should be used as a permit limit to assure compliance with the 24-hour ambient air quality standards.

Table 3.3 AVERAGE HOURLY TOXIC POLLUTANT EMISSION RATES							
Sources	Acetaldehyde (lb/hr)	Arsenic (lb/hr)	Benzene (lb/hr)	Cadmium (lb/hr)	Formaldehyde (lb/hr)	Nickel (lb/hr)	PAH (lb/hr)
Generator No. 1	1.31E-06	NA	4.04E-05	NA	4.09E-06	NA	1.55E-05
Generator No. 2	1.67E-06	NA	5.16E-05	NA	5.25E-06	NA	1.99E-05
Generator No. 3	8.20E-06	NA	2.53E-04	NA	2.56E-05	NA	9.73E-05
Generator No. 4	4.81E-05	NA	5.84E-05	NA	7.40E-05	NA	1.46E-05
Generator No. 5	3.14E-06	NA	3.81E-06	NA	4.82E-06	NA	9.49E-07
Generator No. 6	4.65E-06	NA	5.66E-06	NA	7.15E-06	NA	1.41E-06
Generator No. 7	8.10E-06	NA	2.49E-04	NA	2.53E-05	NA	9.61E-05
Boiler No. 1	NA	2.81E-06	2.95E-05	1.55E-05	0.001052	2.95E-05	NA
Boiler No. 2	NA	2.81E-06	2.95E-05	1.55E-05	0.001052	2.95E-05	NA
Boiler No. 3	NA	2.81E-06	2.95E-05	1.55E-05	0.001052	2.95E-05	NA
Boiler No. 4	NA	2.81E-06	2.95E-05	1.55E-05	0.001052	2.95E-05	NA

The applicant requested an increase in the combined natural gas fuel use for all of the boilers. The boilers all have the same operating and stack parameters. The applicant modeled the boiler emissions as if they all came from two stacks. One stack accounts for all of the natural gas fuel use and the other accounts for all of the No. 2 fuel oil use. The applicant used four separate boilers, each with identical release parameters to estimate the toxic pollutant concentrations. DEQ reviewed this methodology and determined it was representative of St. Luke's boiler and generator configuration.

### 3.3 Emission Release Parameters

The boilers all have the same stack release parameters. The boiler parameters in the following table represent all four of the facility's boilers. The modeling analysis did not use actual UTM coordinates. DEQ reviewed this methodology and determined that it is appropriate for this facility because it is located on flat terrain and the maximum concentrations occur very close to the facility.

Table 3.4 STACK RELEASE PARAMETERS							
Source	Eastings <sup>a</sup> (m)	Northing <sup>a</sup> (m)	Elevation <sup>b</sup> (m)	Height (ft)	Temperature (°F)	Exit Velocity (m/s)	Diameter (ft)
Generator No. 1	2.73	-2.04	0	42.0	818	44.0	1.08
Generator No. 2	10.35	-6.78	0	42.0	889	51.0	1.08
Generator No. 3	18.68	-12.1	0	42.0	1,027	66.5	1.25
Generator No. 4	7.33	-11.38	0	42.0	702	31.0	0.75
Generator No. 5	-24.68	-107.52	0	58.4	382	21.0	0.66
Generator No. 6	-28.03	-112.07	0	58.4	382	21.0	0.66
Generator No. 7	29.6	0.69	0	14.0	847	73.1	1.17
Boilers	-5.71	-18.57	0	29.1	365	18.2	2.00

<sup>a</sup>Not actual UTM coordinate. Based on datum used in model.

<sup>b</sup>Not actual elevation. Based on flat terrain assumption.

### 3.4 Results

#### 3.4.1 Full Impact Analysis Results

Table 3.5 FULL IMPACT ANALYSIS RESULTS						
Pollutant	Averaging Period	Facility Ambient Impact (µg/m <sup>3</sup> )	Background Concentration (µg/m <sup>3</sup> )	Total Ambient concentration (µg/m <sup>3</sup> )	NAAQS (µg/m <sup>3</sup> )	Percent of NAAQS
PM <sub>10</sub>	24-hour	34.0	95	129.0	150	86.0%
	Annual	2.6	33.7	36.3	50	72.5%
CO	1-hour	547.1	15,600	16147.1	40,000	40.4%
	8-hour	235.3	6,800	7035.3	10,000	70.4%
SO <sub>2</sub>	3-hour	859.5	120	979.5	1,300	75.3%
	24-hour	184.0	40	224.0	365	61.4%
	Annual	20.0	10	30.0	80	37.5%
NO <sub>2</sub>	Annual	41.7	40	81.7	100	81.7%

### 3.4.2 Toxic Air Pollutants Results

Table 3.6 TOXIC AIR POLLUTANTS ANALYSIS RESULTS					
Pollutant	Year	Averaging Period	Maximum Concentration ( $\mu\text{g}/\text{m}^3$ )	AACC ( $\mu\text{g}/\text{m}^3$ )	Percent of AACC
<b>Carcinogens</b>					
Acetaldehyde	91	Annual	1.20E-04	4.50E-01	0.0%
Arsenic	87	Annual	1.00E-04	2.30E-04	43.5%
Benzene	87	Annual	1.35E-03	1.20E-01	1.1%
Cadmium	87	Annual	5.00E-04	5.60E-04	89.3%
Formaldehyde	87	Annual	3.75E-02	7.70E-02	48.6%
Nickel	87	Annual	1.05E-03	4.20E-03	25.0%
PAH	87	Annual	1.00E-05	3.00E-04	3.3%

<sup>a</sup>Not actual UTM coordinate. Based on datum used in model.

<sup>b</sup>Not actual elevation. Based on flat terrain assumption.

## 4.0 CONCLUSION

The modeling analysis, and subsequent building parameter and emission rate corrections, demonstrates, to DEQ's satisfaction, that the project will not cause or significantly contribute to a violation of any ambient air quality standards as long as the key assumptions are federally enforceable.

**Appendix**  
**PM<sub>10</sub> Isopleth**

St. Louis - 24-hour Maximum PM10 Concentrations (1988)

